

**Carmel Mountain and Del Mar Mesa Management Plan
Public Scoping Meeting
February 27, 2001**

Attendees

Susan Anuskiewicz, Parcel owner

Holly Boessow, City of San Diego MSCP

Slader Buck, U.S. Fish and Wildlife Service, Refuges Division

Kathryn Burton, Sorrento Hills Community Planning Board and Friends of Carmel Mountain

Chuck Corum, Pardee Homes

Mark Doderer, RECON

Beth Fischer, Pardee Homes

Paul Fromer, RECON

Marvin Gerst, Del Mar Mesa Planning Board

Diana Gordon, Carmel Mountain Conservancy

Keith Greer, City of San Diego MSCP

David Hogan, Center for Biological Diversity

Jan Hudson, Del Mar Mesa Planning Board

Robert Hutzel, City of San Diego Mayor's Office

Isabelle Kay, Carmel Mountain Conservancy

Mike Kelly, Environmental Conservation Foundation

Bill Lawrence, City of San Diego Park and Recreation

Jeanette DeAngelis, City of San Diego Park and Recreation

Todd Philips, City of San Diego Council District 1

John Quirk, State Parks

Allison Rolfe, San Diego Audubon Society

Lisa Ross, Friends of Carmel Mountain

Oliver Ryder, La Jolla Friends Meeting

Thomas Steinke, SCMU/Pardee Homes

Bobbie Stephenson, RECON

Mark Webb, County of San Diego Park and Recreation

Mike Wells, State Parks

Susan Wynn, U.S. Fish and Wildlife Service, Ecological Services

Scoping meeting issues

Multiple Jurisdiction Requirements

- Plan should address what is prohibited by all the different jurisdictions. (Mark Webb)
- Land should be managed in accordance with the NWR requirements and the NWR designations for that unit. (Slader Buck)
- Management plan will ultimately be used by Refuges to satisfy their management plan requirements for these areas and the action items incorporated into the plan will need to be compatible with the federal system. (Slader Buck)
- Refuges is mandated to analysis the potential for hunting and fishing in all NWR areas, however, it is anticipated that resource protection will be an appropriate priority for this area and hunting/fishing will not be allowed. (Slader Buck)
- The Carmel Mountain vernal pools should be included within the NWR Vernal Pool Stewardship Project. (Isabelle Kay)
- In order to bring Carmel Mountain into the NWR, an act of Congress would be needed. However, the management plan can recommend that Carmel Mountain be managed like a NWR if appropriate. (Slader Buck)
- Cooperative agreement between agencies should be addressed in the management plan. If developed, cooperative agreements can help achieve consistency in management. (Slader Buck)

Restoration

- Restoration potential of the management plan areas should be addressed. (Keith Greer)
- Plan should evaluate restoration potential (i.e. Dudleya) and the possibility of reintroduction of appropriate species (i.e. Orcutt's spineflower). (David Hogan)
- Management plan should address the potential for active mitigation/restoration projects. (Bill Lawrence)
- Management plan should prioritize corridors for revegetation and monitoring. (Bill Lawrence)

Enforcement

- Management plan/working group should explore the possibility of improving City ordinances in order better enforce open space protection. For example, there is no City ordinance requirement to stay on trails and there are no dog free areas in the City of San Diego. (Bill Lawrence)

- City ordinance requires that no bikes be allowed on single track trails, only designated park service roads. All applicable City ordinances should be referenced in the management plan. (Bill Lawrence)
- Enforcement section of the management plan should address limitations. For example, violations must be seen by the officer in order to enforce, there are a limited number of officers, and police cannot be called for “minor” crimes, only “major” crimes such as illegal ORV use. (Bill Lawrence)
- Encroachment issues should be addressed including adjacent developments dropping fences into the preserve. Can encroachment violations be enforced through the project tentative map?

Trails/Access

- Maintain trails and access for a variety of uses. (Keith Greer)
- GIS should be used to identify existing roads and trails. Redundant trails should be identified. (David Hogan)
- Plan should required that trails be clearly delineated. (David Hogan)
- Plan should address where trails will be and what users groups will be permitted on which trails. Mountain bike use must be address included which uses will be allowed on hard trails versus soft trails. (Marvin Gerst)
- Trails need to link to other off-site trail systems. (Marvin Gerst)
- Plan should address whether staging areas is needed, if one will be provided, and if one will not be provided, how undesirable parking and staging will be prevented. (Marvin Gerst)
- Critical linkages to the Trans County Trail should be maintained. (John Quirk, Mike Wells)
- Management plan should address the potential to provide a connecting trail to CVREP. Currently Carmel Mountain and CVREP are separated by a fence. (Isabelle Kay)
- Management plan should thoroughly address trails. No trails should be allowed in vernal pools. (Anne Harvey for Kathryn Burton)
- The park location should be discussed in the management plan. Management plan should discuss whether the park location is appropriate taking into account that it will be a main trail head for three communities. (Anne Harvey)
- Management plan should address the context of the trails as part of a system of trails that continue off-site. (Robert Hutsel)
- If trails are closed, management plan should recommend that a sign be posted stating the reason for closure. (Robert Hutsel)

- CVREP access is limited making access difficult for horse riders. In turn, the horse riders can cause damage by developing new trails to get around. Management plan should consider the potential for a connection to CVREP. (Lisa Ross/Marvin Gerst)
- Management plan should clearly identify access points in regard to adjacent development. (David Hogan)
- Management plan should identify standard widths of trails for each use. (Marvin Gerst)
- Management plan should address maintenance requirements that SDG&E has for their access easements. The management plan should also consider if these access easements can double as trails.
- Trail requirements for horse riders should be considered in the management plan. Paving cannot be used for horse trails because it can result in horseshoe damage and slippage. Decomposed granite or some sort of dirt surface is required for horses. Surface also needs to be able to hold up under the weight of the horses. The width standards that the City has developed for horse trails are not necessary. Trail does not need to be very wide, only needs good drainage. Single track trails can work for horse riders as long as there are no conflicting uses (i.e. bikes). Turnouts can be used to accommodate multiple uses on narrow trails. City requires that trails be safe and maintainable.
- Some feel that trail redundancy should be reduced. Others feel that trail redundancy can give a feeling of being in the open space “on your own”.
- Management plan should identify trails based on allowed usage (who goes where).
- The northeastern area of Carmel Mountain is being accessed by horses taking advantage of the recent burn area. Management should address the damage caused by the new horse trails created. (Diana Gordon)

Natural Resource Protection

- Protect endangered species. (Keith Greer)
- Open space areas should be managed like Torrey Pines, with an emphasis on resource protection and only accommodating access where appropriate. (David Hogan)
- Plan should address the responsibility of MSCP to facilitate recovery of covered species. (Oliver Ryder)
- Plan should address the requirements and needs of MSCP, including covered species management and monitoring. (Susan Wynn)

- Active management of the site will require a certain level of knowledge since this area is unique and has more endangered species per square foot than any other area. Therefore, the plan will need a basis for informed decision making. (Oliver Ryder)
- Management plan should address the biotic and non-biotic factors that effect the animal and plant populations on-site. (Oliver Ryder)
- Management plan should focus on the ecosystem and population viability. (Oliver Ryder)
- Management plan areas should be managed for the resources like Torrey Pines. (John Quirk, Mike Wells)
- Management plan should determine if we will have enough land to support the species within the management plan areas and recreational uses. Protection of the species should be the primary goal of the management plan. (Isabelle Kay)
- Management plan should include a feasibility study for bobcat monitoring. (Isabelle Kay)
- Sensitive species monitoring protocols should be included in the management plan. (Mike Kelly)
- Management plan's emphasis should be on natural resources. (Allison Rolfe)

Cultural Resources

- Management plan should emphasize the identification of natural and cultural resources within the management plan areas. (Bill Lawrence)
- Cultural resources should be identified and provisions for their protection should be included in the management plan. (Mike Kelly)
- Management plan should address historical preservation. For example, pickets from historic development on-site that should be preserved have been removed from the open space areas. (Diana Gordon)

Recreational Uses

- If preservation of ecosystem function is a goal of the plan, recreation must be compatible with that goal. (John Quirk, Mike Wells)
- Management plan should address controlled use while incorporating as many uses as possible. All activities should be considered. For example, the management plan should discuss how to incorporate mountain bikers but still control their use on the site. (Chuck Corum)
- Management plan should address the decline of horse riders in open space areas and the apparent increase of mountain bikers. Management plan should also

address that mountain bikers typically like to ride on steep trails which can result in erosion and damage. (Jan Hudson)

- Potential commercial recreation uses should be planned for in the management plan. Examples include various running races, hiking groups such as Happy Trails, etc. Commercial recreation uses can also be considered a potential source of funding. (Robert Hutsel)
- Try to evaluate a wide variety of activities in the management plan even if they are not currently being pursued in the management plan areas. A position on whether each activity or activity type will be allowed should be clearly stated in the management plan (i.e. hang gliding). Management plan should also explore potential group activities (i.e. races) to determine if such uses will be allowed and if a permit will be required for those uses. If group activities are currently allowed to use the site without permits, the management plan should discuss a possible permit system for such activities. (Mike Kelly)
- When the voters approved the acquisition of Carmel Mountain, they were told that it would be a recreational area. Carmel Mountain is considered an important park area, especially for Carmel Valley. This should be considered when developing the management plan and considering which uses will be allowed on-site. (Lisa Ross)
- A oversight group on recreation use should be developed for Carmel Mountain and Del Mar Mesa. The oversight group would consider new proposed uses and determine if they can be accommodated within the open space areas.

Private Property

- Provide access for private properties using the least environmentally damaging alternative. (Keith Greer)
- Plan should allow private property to be folded into the plan if ultimately conserved. (Keith Greer)
- Management plan should address access for private property owners. Land swaps might also be an option. (Susan Anuskiewicz)
- Access easement to Schlacter should be vacated.

Format

- Incorporate City and other agencies management plan formats. (Keith Greer)
- Plan should not be vague. If there is not enough money to do all the sections in a detailed manner, those sections should be completed at a later date when funding is available. (David Hogan)

- Since there will be a lot of pressures from user groups, the management plan should have a clear statement of purpose and intent. For example, the intent of the plan could be to implement the MSCP or to protect the species within the management plan areas. If so, the management plan statement must be clear to this effect in order to defend against incompatible uses. (John Quirk, Mike Wells)
- Management plan should be designed so it can be actively used in the field. (Bill Lawrence)
- This management plan should provide more specific direction for management than other open space management plans that have been developed in the past (i.e. Penasquitos Preserve management plan). Plan specificity should be taken down to the species level. (Mike Kelly)

Funding

- Plan development should best utilize limited grant funds and plan should address limited management resources when discussing management plan implementation. (Keith Greer)
- Management plan should allow for funding through such sources as grants, fines, and settlements. (Bill Lawrence)
- Opportunities and funding will open up when management plan is in place so it is important to get it completed as soon as possible so implementation can begin. (Bill Lawrence)
- Additional funds may be available if all issues cannot be addressed adequately with the funding provided. This management plan should be a “gold plated” management plan. (Mike Kelly)
- The level of management needed to accomplish the goals of the management plan should be addressed. A financing plan should be included in the management plan and the management plan should identify what resources will be needed to accomplish management goals. (Mike Kelly)
- If resources are pooled, costs can be lower. Management plan should address pooling of resources and cost sharing methods when considering the cost and resources needed for management. (Slader Buck)

Fire Management

- Plan should incorporate a fire management plan, similar to Irvine (Mark Webb)
- Plan should incorporate a prescribed burn plan. (David Hogan)
- Management plan should address the use of controlled fire for resource management. (Isabelle Kay)

- Management plan should include a fire suppression plan which would instruct fire fighters on precautions to take when fighting fires in order to protect the resources (i.e. avoid vernal pools). (Mike Kelly)
- Prescriptive fire should also be addressed in the management plan, but should be carefully evaluated. Prescriptive fire is not always good. (Mike Kelly)

Education

- Plan should include a public education component for the surrounding neighborhoods. (David Hogan)
- Management plan should consider developing education plans with adjacent schools (i.e. San Diego Jewish Academy). (Lisa Ross)
- Horse community is getting smaller and there are only a few horse ranches in the area. Management plan should explore an education program on environmental awareness for nearby horse ranches. (Lisa Ross)
- A education program with local schools for open space areas is already in place. It is called Site Stewardship. The management plan should discuss this program and it's potential use within the management plan areas.

Interim planning

- Interim planning should be done to ensure that areas are properly protected during the plan development process. For example, there is a great potential for ORV use as surrounding developments come in and provide access to the site. (David Hogan)
- Management plan and interim measures should identify immediate threats to management plan areas. (Isabelle Kay)
- Action should be taken in the interim before the management plan is completed to protect the management plan open space area. For example, gates are unlocked on Del Mar Mesa. (Jan Hudson)
- Management plan and interim measures should address damage to short-leaved dudleya by horses, damage to vernal pools by adjacent development, and damage to open space by new horse trails. (Diana Gordon)

Management Monitoring

- Use objective data to support health and persistence of the community. Monitoring data should provide robust figures that can be used to guide management. (Oliver Ryder)
- There should be quantitative management goals and a monitoring program should be established in order to determine if management goals are being achieved. (John Quirk, Mike Wells)
- Management plan should provide guidance for monitoring recreational use on-site. Open space use will increase over time and the management plan should provide guidance in order to adequately protect the open space areas.

Adjacent Development/Edge Effects

- Management plan should analyze the high rate of development in recent years and its effect on the management plan areas. (Isabelle Kay)
- Management plan should address preserve edges. Recommended practices for adjacent developments include: controlling lighting, drainage, pet intrusion, etc. (Anne Harvey)
- Management plan should address threats that potential developments could have on wildlife and wildlife connections. (Isabelle Kay)
- The drainage from Torrey Surf and other developments should be discussed. (Anne Harvey)
- Projects will border the natural open space areas. Management plan should address measures to protect against edge effects. For example, fencing should protect from pet intrusion and, in some cases, the fences should be buried to prevent domestic animals from crawling under. (Allison Rolfe)
- Wrought iron fences allow for cat access to natural open space areas. Management plan should consider an improved barrier system to protect against edge effects. (David Hogan)

Threats

- Damage to open space areas has occurred due to inadequate horse access (horse riders making their own trails or using eroded trails). Management plan should identify how to stop this damage. (Isabelle Kay)
- Management plan should identify exotic plant and animal species within management plan areas. (Isabelle Kay)
- Management area land should be properly used. Management plan should address trail usage, trash, migrant worker camps, etc. (Chuck Corum)

- Management plan should address control of illegal off-road vehicle use. (Robert Hutsel)

Volunteers

- Management plan should encourage a high level of citizen involvement. The potential for volunteer patrols or park watch programs (residents who have a view of the park from their homes would call in violations) to be developed should be addressed in the plan. (Bill Lawrence)
- Management plan should discuss the potential for management of the open space areas by volunteer groups. (Robert Hutsel)
- Management plan should include positive language for management of open space areas by volunteers. (Mike Kelly)
- Current volunteer force is small and not effective. Management plan should discuss how volunteer force and other protection measure can be made more effective. (Diana Gordon)

Design Issues

- Management plan should promote design which prevents a suburban/urban experience within the open space areas. Minimal signs, fences, chains, etc. should be used. (Lisa Ross)
- Management plan should address placement of interpretive signs from various environmental groups (i.e. San Diego Audubon). (Allison Rolfe)

Miscellaneous

- The project consultants should not be afraid to make recommendations to the working group or in the plan. (Anne Harvey)
- A copy of the management plan developed by Carmel Mountain Conservancy should be given to the project consultants. (Isabelle Kay)
- City should look at incorporating Del Mar Mesa into Los Penasquitos Preserve. (Robert Hutsel)
- Other groups not represented at the scoping meeting should be included (i.e. trails coalition, bikes coalition). (Robert Hutsel)
- Pardee has established a conservation bank on Carmel Mountain which must be protected and allowed to function properly. (Beth Fischer)
- Acquisition targets should be identified in the management plan. (Allison Rolfe)

Preserve Management Issues

1.0 Issues

A Public Scoping Meeting was held by the City of San Diego on February 27, 2001 to hear the issues of concern by agencies, jurisdictions, and public stakeholders. At the meeting, City staff described the intention of preparing a management plan for the Carmel Mountain and Del Mar Mesa Preserves and each person in attendance identified the issues they thought should be addressed in the plan.

A list of attendees and issues introduced was prepared by the City (Attachment 1). The Management Plan addresses these issues and others identified after the scoping meeting.

Issues introduced fall into these categories:

- Multiple jurisdictions having different requirements
- Habitat restoration
- Open space protection enforcement
- Trails and access
- Natural resource protection
- Cultural resource protection
- Allowable recreational uses
- Private property access
- Format of the plan
- Funding for implementing the plan
- Fire management
- Education program
- Interim planning
- Management monitoring
- Adjacent development and other edge effects
- Threats to the natural and cultural resources
- Volunteer involvement
- Park design
- Public use
- Urban encroachment
- Easements
- Erosion and sedimentation
- Brush management
- Miscellaneous

The issues introduced at the scoping meeting are described below.

1.1 Multiple Jurisdictions Having Different Requirements

The properties within the Preserves are owned by many different public and private entities. For example, the USFWS National Wildlife Refuge system has management directives for their unit that falls within the Del Mar Mesa Preserve, and other entities have prohibitions against certain activities. The issue was raised that the management plan must take all these items into consideration to be ultimately useful to all property owners. Cooperative agreements between agencies should be addressed in the plan.

Utility easements across the preserves often require maintenance which need to be integrated with Preserve management tasks.

1.2 Habitat Restoration

The restoration of the management plan area should be addressed, in particular, the plan should evaluate the restoration potential for small-leaved live-forever (*Dudleya blochmaniae* ssp. *brevifolia*) and the possibility of reintroduction of other appropriate species such as Orcutt's spineflower (*Chorizanthe orcuttiana*). Active mitigation and habitat restoration projects should be considered, and areas for habitat restoration and monitoring should be prioritized.

1.3 Open Space Protection Enforcement

The issues of enforcing ordinances and Preserve rules, and enforcement limitations was requested to be addressed in the plan.

1.4 Trails and Access

The major issue concerning the trails and access to them is that the trail system must be developed for a variety of uses. Existing roads and trails, redundant trails, and where trails link to off-site trails systems, such as the Trans County Trail, and to the CVREP (Carmel Valley Riparian Enhancement Program), and trail access points should be identified and clearly delineated on maps in the plan. Trail characteristics of various activities should be considered.

1.5 Natural Resource Protection

The overriding issue of the Preserves is how to protect endangered species while allowing the public to use and enjoy them.

1.6 Cultural Resource Protection

As with natural resources, the issue is how to protect the cultural resources while allowing the public to use and enjoy the recreational uses of the Preserves.

1.7 Allowable Recreational Uses

The issue is how to integrate recreational uses with the protection of biological and cultural resources. The plan needs to address allowable and prohibited uses.

1.8 Private Property Access

A few private parcels are surrounded by Preserve lands; the property owners require access to their property.

1.9 Format of the Plan

Specificity and compatibility with agency management plan formats was requested for this plan.

1.10 Funding for Implementing the Plan

Implementing a management plan for the two Preserves will be costly. Funding possibilities, such as grants, fines, and settlements, should be considered and discussed in the plan.

1.11 Fire Management

The concern is the implementation of fire management on both Preserves.

1.12 Education Program

Incorporation of an environmental awareness education program with schools of surrounding neighborhoods, such as the Site Stewardship program, should be addressed in the plan and made part of the Preserve management program.

1.13 Interim Planning

At the scoping meeting, implementing interim protection measures to protect resources before the plan is completed was requested.

1.14 Management Monitoring

Quantitative monitoring should be used to guide management of the Preserves.

1.15 Edge Effects and Urban Encroachment

The effects of the adjacent developments on the Preserves, and the urban/wildland interface should be addressed in the plan.

1.16 Threats to the Natural and Cultural Resources

Existing threats to the resources were identified at the scoping meeting: inadequate trail, access for horseback riders, exotic plant and animal invasion, and off-road-vehicle use.

1.17 Volunteer Involvement

It was suggested that volunteer citizen involvement be encouraged in the plan.

1.18 Erosion and Sedimentation

Erosion along the trails and within disturbed areas is of concern.

1.0 General Management Plan for MSCP Areas

1.1 Description of Northern Area

The City has about two-thirds of the Los Penasquitos Lagoon/Canyon and Del Mar Mesa core area within its subarea. This core resource area encompasses one of the few intact natural open space areas in coastal San Diego County that is still linked to larger expanses of habitat to the east. Los Penasquitos Canyon is a regional corridor linking coastal habitats to inland habitats on Black Mountain and in Poway. Important resources in this area include saltmarsh, coastal sage scrub, and southern maritime chaparral. Covered species include San Diego thorn-mint, Shaw's agave, Del Mar manzanita, Encinitas baccharis, Orcutt's brodiaea, wart-stemmed ceanothus, short-leaved dudleya, variegated dudleya, San Diego button-celery, San Diego barrel cactus, willow monardella, San Diego goldenstar, Torrey pine, San Diego mesa mint, Riverside fairy shrimp, southwestern pond turtle, San Diego horned lizard, orange-throated whiptail, California brown pelican, white-faced ibis, Canada goose, northern harrier, Cooper's hawk, golden eagle, western snowy plover, California least tern, burrowing owl, coastal cactus wren, California gnatcatcher, California rufous-crowned sparrow, Belding's savannah sparrow, grasshopper sparrow, mountain lion, and mule deer.

The northern area encompasses a large amount of developed and undeveloped land stretching from the Black Mountain Ranch area of the North City Future Urbanizing Area (NCFUA) south to Lopez Canyon in Los Penasquitos Canyon Preserve in Mira Mesa, and from the coast to Interstate 15. The area encompasses the communities of Carmel Valley, Sorrento Hills, Torrey Pines, Rancho Penasquitos, a portion of Mira Mesa, the Via de la Valley Specific Plan area, and the entire 12,000-acre NCFUA. In addition, the area also includes Torrey Pines State preserve, the Los Penasquitos Lagoon, and Los Penasquitos Canyon Preserve. The majority of the undeveloped private land is disturbed habitat, much of it having been farmed or grazed for decades or longer.

The MHPA in this area is largely comprised of regional linkages leading to biological core areas within existing reserves and parks. In the north lies the area surrounding Black Mountain Park, much of which serves as core area immediately in and surrounding the park, with the remainder of the lands allowing connections to the San Dieguito River Valley to the north and west, and providing one end of a lengthy regional corridor to the south. The core area contains valuable native habitats: mixed and chamise chaparral, coastal sage scrub, and native grassland. The corridor/linkage areas currently contain much non-native and disturbed habitat, including invasive exotic

species, and are in need of enhancement/restoration. The corridors also contain areas with non-native grasslands that are considered important raptor foraging habitats.

The central portion of the northern area is comprised of the heart of the City's North City Future Urbanizing Area, known as NCFUA Subareas 2, 3, 4, and 5. These encompass the San Dieguito Lagoon area, Gonzales Canyon, and most of the area lying between the communities of Carmel Valley and Rancho Penasquitos. NCFUA Subareas 3 and 4 contain only extended regional corridors, linking to the north, west, and south. These corridors primarily lie in canyons or drainages (e.g. La Zanja Canyon, McGonigle Canyon, and Gonzales Canyon), and the majority require restoration to enhance their long-term habitat value, as they are currently in agriculture and disturbed lands. NCFUA Subarea 5 contains core habitat area on the Del Mar Mesa north of Los Penasquitos Canyon Preserve as well as linkages containing disturbed lands and habitat leading toward Carmel Valley and Carmel Creek. NCFUA Subarea 2 contains a portion of the San Dieguito Lagoon enhancement area east of the I-5 freeway. The proposed MHPA boundary in this area is consistent with the open space configuration of the NCFUA Framework Plan, and contains wetlands including the San Dieguito River, limited coastal sage, chaparral, grasslands, and agriculturally disturbed lands.

The southwestern portion of this area contains Torrey Pines State Park, Crest Canyon, Los Penasquitos Lagoon, and Los Penasquitos Canyon Preserve which are core biological resource areas with high to moderate habitat values. Los Penasquitos Canyon Preserve contains large expanses of non-native grassland, and contains some restoration opportunities within its boundaries. This portion of the MHPA also contains linkages and habitat within the southern Carmel Valley neighborhoods (e.g. 8, 8A, and 10) and the Carmel Valley Restoration and Enhancement Project (CVREP), which is intended to serve as a wildlife linkage to the Los Penasquitos Lagoon and Torrey Pines State Park. Carmel Valley Neighborhood 10 contains two major wildlife corridors that converge at CVREP, where they link to adjacent core habitat on and north of Neighborhood 8A. Neighborhood 8, where CVREP is located, also contains existing houses, ranches, and rural-oriented businesses. These are incorporated within the MHPA boundary as low-density areas conditionally compatible with the MHPA.

The linkages to Torrey Pines State Reserve and Los Penasquitos Lagoon from the east are tentative at best. In the south, a rip-rap channel winds west from Los Penasquitos Canyon, underneath freeways, local roads, and railroad tracks to gain access to the Lagoon and State Park. The northern connection to the lagoon is located at the western terminus of CVREP, with 6-8 feet of clearance under the I-5 freeway to allow for Carmel Creek to drain into the lagoon. This wildlife connection is constrained as well.

The eastern portion of the Northern area includes linkages and open space within the Rancho Penasquitos, Mira Mesa, Sabre Springs, Scripps Ranch and Miramar Ranch communities, Miramar Lake and the General Dynamics property/Beeler Canyon area. This area includes core habitat in the Miramar-Poway areas as well as linkages that

extend from Los Penasquitos Canyon Preserve east through Sabre Springs into the Miramar Lake area, MCAS Miramar and Sycamore Canyon Regional Park. The proposed MHPA in this area is consistent with the open space of the existing communities, and includes a large block of habitat in the easternmost portion. This block of habitat is a mixture of chaparral and coastal sage scrub and is located immediately west of Sycamore Canyon Regional Park and north of MCAS Miramar.

1.1.1 General Management Plan for MSCP Areas

1.1.1.1 Management Goals and Objectives

The habitat management aspect of the City of San Diego's MHPA is an important component of the MSCP, related to the goal of the Program. The overarching MSCP goal is to maintain and enhance biological diversity in the region and conserve viable populations of endangered, threatened, and key sensitive species and their habitats, thereby preventing local extirpation and ultimate extinction, and minimizing the need for future listings, while enabling economic growth in the region.

Where land is preserved as part of the MSCP through acquisition, regulation, mitigation or other means, management is necessary to continue to ensure that the biological values are maintained over time, and that the species and habitats that have been set aside are adequately protected and remain viable.

The City will be responsible for and will continue the management and maintenance of its existing public lands (including those with conservation easement), at current levels. The City will also manage and maintain lands obtained as mitigation where those lands have been dedicated to the City in fee title or easement, and land acquired with regional funds within the City's MHPA boundaries. Likewise, the Federal and State agencies will manage, maintain and monitor their present land holdings, as well as those they acquire on behalf of the MSCP, consistent with the MSCP. Lands in the MHPA which are set aside as open space through the development process but are not dedicated in fee to the City, or other acceptable entity, will be managed by the landowner consistent with approved Mitigation, Monitoring and Reporting Programs or Permit conditions. Private owners of land within the MHPA, who are not third party beneficiaries, will have no additional obligations for the management or maintenance of their land.

In order to assure that the goal of the MHPA is attained and fulfilled, management objectives for the City of San Diego MHPA are as follows:

1. To ensure the long-term viability and sustainability of native ecosystem function and natural processes throughout the MHPA.

2. To protect the existing and restored biological resources from intense or disturbing activities within and adjacent to the MHPA while accommodating compatible public recreational uses.
3. To enhance and restore, where feasible, the full range of native plant associations in strategic locations and functional wildlife connections to adjoining habitat in order to provide viable wildlife and sensitive species habitat.
4. To facilitate monitoring of selected target species, habitats, and linkages in order to ensure long-term persistence of viable populations of priority plant and animal species and to ensure functional habitats and linkages.
5. To provide for flexible management of the preserve that can adapt to changing circumstances to achieve the above objectives.

This section lists general management guidelines relevant to the entire City MHPA system, followed by specific guidelines and recommendations for each planned area of the MHPA, including the Otay Mesa area, the Otay River Valley, the Tijuana River Valley, the Eastern Area, Urban Areas, the Northern Area, Lake Hodges and the San Pasqual Valley, and the other Cornerstone Lands. Each area is unique in terms of its existing conditions, MHPA configuration, public or private ownership of land, the existence and location of sensitive species, and management needs.

Based on the above management objectives, the recommended management directives that follow have been identified in order of priority. It is recognized that many of these directives cannot be implemented on approval of the Plan, but will instead occur over the life of the Plan. The ability to implement many of the management directives will be directly related to the availability of funding. In addition, some of the management directives may be implemented as part of mitigation requirements for development projects both within and adjacent to the MHPA. Some of the tasks are also expected to be implemented as research efforts by the scientific and academic community at large.

The management directives are organized by priority into the following two categories. The priorities are intended to assist in the decisions on where to spend limited funds and direct mitigation efforts:

a. Priority 1

Directives that protect the resources in the MHPA, including management actions that are necessary to ensure that the Covered Species are adequately protected. Refer to Appendix A "Species Evaluated for Coverage under the MSCP."

b. Priority 2

Directives other than those required for covered species status and other long-term items that may be implemented during the life of the plan as funding becomes available.

The management directives listed in this section are a preliminary view of the management requirements of the MHPA within the City of San Diego. It is expected that modifications will be needed over time, based on realities encountered in the field as the MHPA is assembled. Monitoring of selected target species and other sensitive or constrained areas within the MHPA will occur as described in the MSCP Biological Monitoring Plan (under separate cover) with a general description of the Monitoring Plan provided in Section 1.5.13. The Monitoring Plan will inform MHPA (preserve) managers and staff of the general trends of wildlife use and species preservation, as well as indicate areas where special management focus is needed. Cooperation between the field managers, MSCP habitat management technical committee, and the wildlife agencies, is expected to occur to review and discuss existing and new management issues and to respond with practical, case-sensitive solutions. These solutions should be documented, and this management plan should be revised as needed to reflect new information.

An integral part of the management component is the previous section on Land Use Considerations that lists compatible land uses and states policies and guidelines related to the development of land uses within and adjacent to the MHPA. These policies and guidelines should be incorporated into projects during the land development review process. It should be noted that some of the management directives listed in the following sections may already be included as conditions of approved projects within or adjacent to the MHPA and are therefore considered part of this Subarea Plan.

1.1.1.2 General Management Directives

The following general management directives apply to all areas of the City of San Diego's MSCP Subarea Plan, as appropriate.

1.1.1.3 Mitigation

Mitigation, when required as part of project approvals, shall be performed in accordance with the City of San Diego Environmentally Sensitive Lands Ordinance and Biology Guidelines.

1.1.1.4 Restoration

Restoration or revegetation undertaken in the MHPA shall be performed in a manner acceptable to the City. Where covered species status identifies the need for

reintroduction and/or increasing the population, the covered species will be included in restoration/revegetation plans, as appropriate. Restoration or revegetation proposals will be required to prepare a plan that includes elements addressing financial responsibility, site preparation, planting specifications, maintenance, monitoring and success criteria, and remediation and contingency measures. Wetland restoration/revegetation proposals are subject to permit authorization by federal and state agencies.

1.1.1.5 Public Access, Trails, and Recreation

a. Priority 1

1. Provide sufficient signage to clearly identify public access to the MHPA. Barriers such as vegetation, rocks/boulders or fencing may be necessary to protect highly sensitive areas. Use appropriate type of barrier based on location, setting and use. For example, use chain link or cattle wire to direct wildlife movement, and natural rocks/boulders or split rail fencing to direct public access away from sensitive areas. Lands acquired through mitigation may preclude public access in order to satisfy mitigation requirements.
2. Locate trails, view overlooks, and staging areas in the least sensitive areas of the MHPA. Locate trails along the edges of urban land uses adjacent to the MHPA, or the seam between land uses (e.g. agriculture/habitat), and follow existing dirt roads as much as possible rather than entering habitat or wildlife movement areas. Avoid locating trails between two different habitat types (ecotones) for longer than necessary due to the typically heightened resource sensitivity in those locations.
3. In general, avoid paving trails unless management and monitoring evidence shows otherwise. Clearly demarcate and monitor trails for degradation and off-trail access and use. Provide trail repair/maintenance as needed. Undertake measures to counter the effects of trail erosion including the use of stone or wood crossjoints, edge plantings of native grasses, and mulching of the trail.
4. Minimize trail widths to reduce impacts to critical resources. For the most part, do not locate trails wider than 4 feet in core areas or wildlife corridors. Exceptions are in the San Pasqual Valley where other agreements have been made, in Mission Trails Regional Park, where appropriate, and in other areas where necessary to safely accommodate multiple uses or disabled access. Provide trail fences or other barriers at strategic locations when protection of sensitive resources is required.
5. Limit the extent and location of equestrian trails to the less sensitive areas of the MHPA. Locate staging areas for equestrian uses at a sufficient distance (e.g.

300-500 feet) from areas with riparian and coastal sage scrub habitats to ensure that the biological values are not impaired.

6. Off-road or cross country vehicle activity is an incompatible use in the MHPA, except for law enforcement, preserve management or emergency purposes. Restore disturbed areas to native habitat where possible or critical, or allow to regenerate.
7. Limit recreational uses to passive uses such as birdwatching, photography and trail use. Locate developed picnic areas near MHPA edges or specific areas within the MHPA, in order to minimize littering, feeding of wildlife, and attracting or increasing populations of exotic or nuisance wildlife (opossums, raccoons, skunks). Where permitted restrain pets on leashes.
8. Remove homeless and itinerant worker camps in habitat areas as soon as found pursuant to existing enforcement procedures.
9. Maintain equestrian trails on a regular basis to remove manure (and other pet feces) from the trails and preserve system in order to control cowbird invasion and predation. Design and maintain trails where possible to drain into a gravel bottom or vegetated (e.g. grass-lined) swale or basin to detain runoff and remove pollutants.

1.1.1.6 Litter/Trash and Materials Storage

a. Priority 1

1. Remove litter and trash on a regular basis. Post signage to prevent and report littering in trail and road access areas. Provide and maintain trash cans and bins at trail access points.
2. Impose penalties for littering and dumping. Fines should be sufficient to prevent recurrence and also cover reimbursement of costs to remove and dispose of debris, restore the area if needed, and to pay for enforcement staff time.
3. Prohibit permanent storage of materials (e.g. hazardous and toxic chemicals, equipment, etc.) within the MHPA and ensure appropriate storage per applicable regulations in any areas that may impact the MHPA, due to potential leakage.
4. Keep wildlife corridor undercrossings free of debris, trash, homeless encampments, and all other obstructions to wildlife movement.

b. Priority 2

1. Evaluate areas where dumping recurs for the need for barriers. Provide additional monitoring as needed (possibly by local and recreational groups on a "Neighborhood Watch" type program), and/or enforcement.

1.1.1.7 Adjacency Management Issues

The following management directives are in addition to those outlined in Section 1.4.3, and refer more specifically to management and monitoring requirements.

a. Priority 1:

1. Enforce, prevent and remove illegal intrusions into the MHPA (e.g. orchards, decks, etc.) on an annual basis, in addition to complaint basis.
2. Disseminate educational information to residents adjacent to and inside the MHPA to heighten environmental awareness, and inform residents of access, appropriate plantings, construction or disturbance within MHPA boundaries, pet intrusion, fire management, and other adjacency issues.
3. Install barriers (fencing, rocks/boulders, vegetation) and/or signage where necessary to direct public access to appropriate locations.

1.1.1.8 Invasive Exotics Control and Removal**a. Priority 1**

1. Do not introduce invasive non-native species into the MHPA. Provide information on invasive plants and animals harmful to the MHPA, and prevention methods, to visitors and adjacent residents. Encourage residents to voluntarily remove invasive exotics from their landscaping.
2. Remove giant reed, tamarisk, pampas grass, castor bean, artichoke thistle, and other exotic invasive species from creek and river systems, canyons and slopes, and elsewhere within the MHPA as funding or other assistance becomes available. If possible, it is recommended that removal begin upstream and/or upwind and move downstream/downwind to control re-invasion. Priorities for removal should be based on invasive species' biology (time of flowering, reproductive capacity, etc.), the immediate need of a specific area, and where removal could increase the habitat available for use by covered species such as the least Bell's vireo. Avoid removal activities during the reproductive seasons of sensitive species and avoid/ minimize impacts to sensitive species or native habitats. Monitor the areas and provide additional removal and apply herbicides if

necessary. If herbicides are necessary, all safety and environmental regulations must be observed. The use of heavy equipment, and any other potentially harmful or impact-causing methodologies, to remove the plants may require some level of environmental or biological review and/or supervision to ensure against impacts to sensitive species.

b. Priority 2

1. If funding permits, initiate a baseline survey with regular follow-up monitoring to assess invasion or re-invasion by exotics, and to schedule removal. Utilize trained volunteers to monitor and remove exotic species as part of a neighborhood, community, school, or other organization's activities program (such as Friends of Penasquitos Preserve has done). If done on a volunteer basis, prepare and provide information on methods and timing of removal to staff and the public if requested. For giant reed removal, the Riverside County multi-jurisdictional management effort and experience should be investigated and relevant techniques used. Similarly, tamarisk removal should use The Nature Conservancy's experience in the Southern California desert regions, while artichoke thistle removal should reference The Nature Conservancy's experience in Irvine. Other relevant knowledge and experience is available from the California Exotic Pest Plant Council and the Friends of Los Penasquitos Canyon Preserve.
2. Conduct an assessment of the need for cowbird trapping in each area of the MHPA where cattle, horses, or other animals are kept, as recommended by the habitat management technical committee in coordination with the wildlife agencies.
3. If eucalyptus trees die or are removed from the MHPA area, replace with appropriate native species. Ensure that eucalyptus trees do not spread into new areas, nor increase substantially in numbers over the years. Eventual replacement by native species is preferred.
4. On a case by case basis some limited trapping of non-native predators may be necessary at strategic locations, and where determined feasible to protect ground and shrub-nesting birds, lizards, and other sensitive species from excessive predation. This management directive may be considered a Priority 1 if necessary to meet the conditions for species coverage. If implemented, the program would only be on a temporary basis and where a significant problem has been identified and therefore needed to maintain balance of wildlife in the MHPA. The program would be operated in a humane manner, providing adequate shade and water, and checking all traps twice daily. A domestic animals release component would be incorporated into the program. Provide

signage at access points and noticing of adjacent residents to inform people that trapping occurs, and how to retrieve and contain their pets.

1.1.1.9 Flood Control

The following management directives are in addition to the General Planning Policies and Guidelines outlined in Section 1.4.2.

a. Priority 1

1. Perform standard maintenance, such as clearing and dredging of existing flood channels, during the non-breeding or nesting season of sensitive bird or wildlife species utilizing the riparian habitat. For the least Bell's vireo, the non-breeding season generally includes mid-September through mid-March.

b. Priority 2

1. Review existing flood control channels within the MHPA periodically (every 5-10 years) to determine the need for their retention and maintenance, and to assess alternatives, such as restoration of natural rivers and floodplains.

1.2 Specific Management Policies and Directives for the MSCP Northern Area

Including the North City Future Urbanizing Area (NCFUA), Carmel Valley, Rancho Penasquitos, Beeler Canyon, Scripps Ranch, Los Penasquitos Canyon and Lagoon, Torrey Pines State Park, Sorrento Hills, and portions of the University and Mira Mesa communities.

1.2.1 Background

1.2.1.1 Goals and Objectives

The MHPA in the Northern area consists primarily of regional wildlife corridors providing linkages to the core areas of Del Mar Mesa, Los Penasquitos Canyon Preserve, Los Penasquitos Lagoon, Torrey Pines State Park, the proposed San Dieguito River Valley Regional Park and the Black Mountain area. These linkages and core areas provide an important network of viable native habitats and plant communities, support the full range of native species, and provide functional wildlife connections over the long-term.

1.2.1.2 Covered Species

Covered species in the Northern area include:

Plants

Del Mar manzanita
Orcutt's brodiaea
Encinitas baccharis
San Diego barrel cactus
San Diego button-celery
San Diego goldenstar
San Diego mesa mint
San Diego thorn-mint
Shaw's agave
Short-leaved dudleya
Torrey pine
Variegated dudleya
Wart-stemmed ceanothus
Willow monardella

Animals

Belding's savannah sparrow
Burrowing owl
California brown pelican
California gnatcatcher
California least tern
California rufous-crowned sparrow
Canada goose
Coastal cactus wren
Cooper's hawk
Golden eagle
Mountain lion
Mule deer
Northern harrier
Orange-throated whiptail
Riverside fairy shrimp
San Diego horned lizard
Southwestern pond turtle
Western snowy plover
White-faced ibis

1.2.1.3 Major Issues

The major issues for management in the Northern area based on existing conditions, are the following, in order of priority:

1. Intense land uses and activities adjacent to and in covered species habitat and linkages.
2. Itinerant living quarters.
3. Enhancement and restoration needs.
4. Exotic (non-native), invasive plants and animals.
5. Water drainage issues, including water quality, urban runoff, erosion, sedimentation, and flood control.
6. Utility, facility and road repair, construction, and maintenance activities.

1.3 Specific Management Directives for the Northern Area

The following policies and directives for the Northern area are described in the following text, generally from north to south and east to west.

1.3.1 North City Future Urbanizing Area:

1.3.1.1 NCFUA Subarea 5

a. Priority 1:

1. Clearly demarcate all trails through the Del Mar Mesa area and provide split rail fencing or barriers and signage along sensitive portions to discourage off-trail use. Trails through this area should use the existing disturbed roads as much as possible. No new trails should be cut through existing habitat. Assess existing dirt and disturbed roads and trails for restoration over the long-term.
2. Develop an equestrian use plan for the Del Mar Mesa area that avoids the vernal pool habitat and their associated watershed areas. If possible, the Del Mar Mesa area should be managed as a single unit rather than split into separate entities according to ownership (County, various City departments, easements).

1.3.1.2 Carmel Valley Neighborhood 8A

a. Priority 1:

1. Redirect human access from vernal pools and dudleya populations through signage and fencing as necessary to delineate and protect the sensitive areas.

2. Develop an equestrian use plan including a trail system so as to avoid as much as possible wetlands and other highly sensitive areas.
3. Monitor this sensitive area for off-road and off-trail use, and take necessary measures to prevent such use, and repair damage (at minimum, closure of areas) as soon as feasible. Also assess for invasive plant species and remove as soon as possible.

b. Priority 2:

1. Use some of the existing dirt roads for trails, and avoid cutting new trails through habitat areas. Restore/revegetate dirt roads (not used as trails) and other disturbed areas to the appropriate habitat (maritime chaparral, vernal pool, grassland, coastal sage scrub), as determined by biologists.

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APPENDIX 3a
PLANT SPECIES OBSERVED ON CARMEL MOUNTAIN

Scientific Name	Common Name	Origin
<i>Achnatherum coronatum</i> (Thurber) Barkworth	Giant needlegrass	N
<i>Adenostoma fasciculatum</i> Hook. & Arn.	Chamise	N
<i>Adolphia californica</i> Wats.	California adolphia, spineshrub	N
<i>Allium praecox</i> Bdg.	Wild onion	N
<i>Ambrosia psilostachya</i> DC.	Western ragweed	N
<i>Anagallis arvensis</i> L.	Scarlet pimpernel, poor-man's weatherglass	I
<i>Antirrhinum nuttallianum</i> Benth. in DC.	Snapdragon	N
<i>Arctostaphylos glandulosa</i> Eastw. ssp. <i>crassifolia</i> (Jepson) Wells	Del Mar manzanita, Costa Baja manzanita	N
<i>Artemisia californica</i> Less.	California sagebrush	N
<i>Atriplex semibaccata</i> R.Br.	Australian saltbush	I
<i>Avena</i> sp.	Wild oats	N
<i>Avena barbata</i> Link	Slender wild oat	I
<i>Baccharis pilularis</i> DC.	Coyote bush	N
<i>Baccharis salicifolia</i> (Ruiz Lopez & Pavón) Pers.	Mule fat, seep-willow	N
<i>Baccharis sarothroides</i> A. Gray	Broom baccharis	N
<i>Bloomeria crocea</i> (Torrey) Cov.	Common goldenstar	N
<i>Brassica nigra</i> (L.) Koch.	Black mustard	I
<i>Brodiaea orcuttii</i> (E. Greene) Baker	Orcutt's brodiaea	N
<i>Bromus hordaceus</i> L.	Smooth brome	I
<i>Bromus madritensis</i> L. ssp. <i>rubens</i> (L.) Husnot	Foxtail chess	I
<i>Calandrinia maritima</i> Nutt.	Seaside calandrinia	N
<i>Callitriche marginata</i> Torrey	Water-starwort	N
<i>Calystegia macrostegia</i> ssp. <i>arida</i> (E. Greene) Brum	Finger-leaf morning morning-glory	N
<i>Calystegia macrostegia</i> ssp. <i>tenuifolia</i> (Abrams) Brum	Chaparral morning-glory	N
<i>Camissonia bistorta</i> (Torrey & A. Gray) Raven	California sun cup	N
<i>Carex triquetra</i> Boott.	Triangular-fruit sedge	N
<i>Castilleja affinis</i> Hook. & Arn. ssp. <i>affinis</i>	Indian paint brush	N
<i>Castilleja exserta</i> (A.A. Heller) Chuang & Heckard	Purple owl's clover	N
<i>Ceanothus verrucosus</i> Nutt.	Wart-stemmed ceanothus	N
<i>Centaurea melitensis</i> L.	Tocolote, star-thistle	I
<i>Centaurium venustum</i> (A. Gray) Rob.	Canchalagua	N
<i>Centunculus minimus</i> L.	Chaffweed	N

APPENDIX 3a
PLANT SPECIES OBSERVED ON CARMEL MOUNTAIN
(continued)

Scientific Name	Common Name	Origin
<i>Cercocarpus minutiflorus</i> Abrams	Mountain-mahogany	N
<i>Chamaesyce polycarpa</i> (Benth.) Millsp.	Spurge	N
<i>Chenopodium</i> sp.	Goosefoot	I
<i>Chlorogalum parviflorum</i> Wats.	Amole, soap plant	N
<i>Chorizanthe staticoides</i> Benth.	Turkish rugging	N
<i>Claytonia perfoliata</i> Willd.	Miner's lettuce	N
<i>Collinsia heterophylla</i> Buist.	Chinese houses	N
<i>Comarostaphylis diversifolia</i> ssp. <i>diversifolia</i> (Parry) E. Greene	Summer holly	N
<i>Conyza canadensis</i> (L.) Cronq.	Horseweed	N
<i>Coreopsis maritima</i> (Nutt.) Hook.f.	Sea-dahlia	N
<i>Corethrogyne filaginifolia</i> var. <i>linifolia</i>	Del Mar sand aster	N
<i>Cortaderia jubata</i> (Lemoine) Stapf	Pampas grass	I
<i>Cotula coronopifolia</i> L.	Brass-buttons	I
<i>Crassula aquatica</i> (L.) Schoen.	Stone-crop	N
<i>Croton californicus</i> Muell.-Arg.	California croton	N
<i>Cryptantha</i> sp.	Cryptantha	N
<i>Datura wrightii</i> Regel	Jimson weed	N
<i>Dicentra chrysantha</i> (Hook. & Arn.) Walp.	Golden ear-drops	N
<i>Dichelostemma capitatum</i> Alph. Wood	Blue dicks	N
<i>Dichondra occidentalis</i> House	Western dichondra	N
<i>Dodecatheon clevelandii</i> E. Greene ssp. <i>clevelandii</i>	Shooting star	N
<i>Dudleya blochmaniae</i> ssp. <i>brevifolia</i> (Eastw.) Moran	Short-leaved dudleya	N
<i>Dudleya edulis</i> (Nutt.) Moran	Lady fingers	N
<i>Dudleya lanceolata</i> (Nutt.) Britt. & Rose	Live-for-ever	N
<i>Dudleya pulverulenta</i> (Nutt.) Britt. & Rose ssp. <i>pulverulenta</i>	Chalk lettuce	N
<i>Elatine</i> sp.	Waterwart	N
<i>Eleocharis macrostachya</i> Britton	Pale spikerush	N
<i>Encelia californica</i> Nutt.	Common encelia	N
<i>Eremocarpus setigerus</i> (Hook.) Benth.	Dove weed	N
<i>Erigeron foliosus</i> Nutt.	Leafy fleabane	N
<i>Eriogonum fasciculatum</i> Benth. var. <i>fasciculatum</i>	California buckwheat	N

APPENDIX 3a
PLANT SPECIES OBSERVED ON CARMEL MOUNTAIN
(continued)

Scientific Name	Common Name	Origin
<i>Eriophyllum confertiflorum</i> (DC.) A. Gray var. <i>confertiflorum</i>	Golden-yarrow	N
<i>Erodium</i> sp.	Filaree, storksbill	I
<i>Erodium botrys</i> (Cav.) Bertol.	Pin-clover	I
<i>Eschscholzia californica</i> Cham.	California poppy	N
<i>Ferocactus viridescens</i> (Torrey & A. Gray) Britt. & Rose	Coast barrel cactus	N
<i>Festuca</i> sp.	Fescue	N
<i>Festuca rubra</i> L.	Red fescue	N
<i>Filago gallica</i> L.	Narrow-leaf herba impia	I
<i>Foeniculum vulgare</i> Mill.	Fennel	I
<i>Galium angustifolium</i> Nutt. <i>angustifolium</i>	Narrow-leaf bedstraw	N
<i>Galium nuttallii</i> A. Gray	San Diego bedstraw	N
<i>Gnaphalium bicolor</i> Bioletti	Bicolored cudweed	N
<i>Gnaphalium californicum</i> DC.	Green everlasting	N
<i>Hazardia squarrosa</i> (Hook. & Arn.) E. Greene	Sawtoothed goldenbush	N
<i>Helianthemum scoparium</i> Nutt.	Peak rush-rose	N
<i>Hemizonia fasciculata</i> (DC.) Torrey & A. Gray	Golden tarplant	N
<i>Heteromeles arbutifolia</i> (Lindley) Roemer	Toyon, Christmas berry	N
<i>Heterotheca grandiflora</i> Nutt.	Telegraph weed	N
<i>Holocarpha virgata</i> (A. Gray) Keck	Tarplant	N
<i>Hypochaeris glabra</i> L.	Smooth cat's-ear	I
<i>Isocoma menziesii</i> (Hook. & Arn.) G. Nesom	Coast goldenbush	N
<i>Isoetes howellii</i> Engelm.	Howell quillwort	N
<i>Jepsonia parryi</i> (Torrey) Small	Mesa saxifrage	N
<i>Juncus bufonius</i> L.	Toad rush	N
<i>Juncus dubius</i> Engelm.	Mariposa rush	N
<i>Juncus mexicanus</i> Willd.	Mexican rush	N
<i>Lasthenia californica</i> Lindley	Goldfields	N
<i>Lessingia filaginifolia</i> (Hook. & Arn.) M.A. Lane var. <i>filaginifolia</i>	California-aster	N
<i>Leymus condensatus</i> (C. Presl) A. Love	Giant ryegrass	N
<i>Lilaea scilloides</i> (Poir) Haum.	Flowering quillwort	N
<i>Lonicera subspicata</i> Hook. & Arn. Var. <i>enudate</i> Rehd.	Wild honeysuckle	N

APPENDIX 3a
PLANT SPECIES OBSERVED ON CARMEL MOUNTAIN
(continued)

Scientific Name	Common Name	Origin
<i>Lotus scoparius</i> (Nutt. In Torrey & A. Gray) Ottley var. <i>scoparius</i>	California broom	N
<i>Lupinus bicolor</i> Lindl.	Miniature lupine	N
<i>Lythrum hyssopifolium</i> L.	Grass poly	N
<i>Malacothamnus fasciculatus</i> (Torrey & A. Gray) E. Greene	Chaparral mallow	N
<i>Malosma laurina</i> (Nutt.) Abrams	Laurel sumac	N
<i>Marah macrocarpus</i> (E. Greene) E. Greene	Wild cucumber	N
<i>Mesembryanthemum crystallinum</i> L.	Crystalline ice plant	I
<i>Mesembryanthemum nodiflorum</i> L.	Slender-leaved ice plant	I
<i>Mimulus aurantiacus</i> Curtis	Bush monkeyflower	N
<i>Mirabilis bigelovii</i> A. Gray var. <i>bigelovii</i>	Wishbone bush	N
<i>Muhlenbergia rigens</i> (Benth.) A. Hitchc.	Deergrass	N
<i>Mulla clevelandii</i> (Wats.) Hoover	San Diego Goldenstar	N
<i>Nassella lepida</i> (A. Hitchc.) Barkworth	Foothill needlegrass	N
<i>Nassella pulchra</i> (A. Hitchc.) Barkworth	Purple needlegrass	N
<i>Navarretia hamata</i> E. Greene	Hooked navarretia	N
<i>Nicotiana glauca</i> Grah.	Tree tobacco	I
<i>Ophioglossum californicum</i> Prantl.	California adder's-tongue	N
<i>Opuntia littoralis</i> (Engelm.) Cockerell.	Shore cactus	N
<i>Opuntia prolifera</i> Engelm.	Cholla	N
<i>Phacelia grandiflora</i> (Benth.) A. Gray	Large-flowered phacelia	N
<i>Phacelia minor</i> (Harvey) Thell	Wild canterbury-bell	N
<i>Phalaris lemmonii</i> Vasey	Lemmon canary grass	I
<i>Pickeringia montana</i> Nutt. var. <i>tomentosa</i> (Abrams) J.M. Johnston	Chaparral-pea	N
<i>Pinus torreyana</i> Carriere	Torrey pine	N
<i>Plagiobothrys</i> sp.	Popcornflower	N
<i>Plantago elongata</i> Pursh	Plantain	N
<i>Plantago erecta</i> Morris	Dot-seed plantain	N
<i>Polypodium californicum</i> Kaulf.	California polypody	N
<i>Psilocarphus brevissimus</i> Nutt. var. <i>brevissimus</i>	Dwarf woolly-heads	N
<i>Psilocarphus tenellus</i> Nutt. var. <i>tenellus</i>	Woolly-heads	N
<i>Quercus dumosa</i> Nutt.	Nuttall's scrub oak	N

APPENDIX 3a
PLANT SPECIES OBSERVED ON CARMEL MOUNTAIN
(continued)

Scientific Name	Common Name	Origin
<i>Raphanus sativus</i> L.	Radish	I
<i>Rhus integrifolia</i> (Nutt.) Brewer & Watson	Lemonadeberry	N
<i>Ribes speciosum</i> Pursh.	Fuchsia-flowered gooseberry	N
<i>Rumex crispus</i> L.	Curly dock	I
<i>Salix lasiolepis</i> Benth.	Arroyo willow	N
<i>Salvia apiana</i> Jepson	White sage	N
<i>Salvia mellifera</i> E. Greene	Black sage	N
<i>Sambucus mexicana</i> C. Presl	Blue elderberry	N
<i>Scrophularia californica</i> Cham. & Schldl.	California figwort	N
<i>Selaginella bigelovii</i> L. Underw.	Bigelow clubmoss	N
<i>Selaginella cinerascens</i> Maxon	Ashy spike-moss	N
<i>Senecio californicus</i> DC.	California groundsel	N
<i>Silene gallica</i> L.	Windmill pink	I
<i>Sisyrinchium bellum</i> Wats.	Blue-eyed-grass	N
<i>Solanum parishii</i> A.A. Heller	Parish's nightshade	N
<i>Sonchus oleraceus</i> L.	Common sow thistle	I
<i>Stephanomeria virgata</i> (Benth.) ssp. <i>virgata</i>	Slender stephanomeria	N
<i>Stylocline gnaphaloides</i> Nutt.	Everlasting nest straw	N
<i>Trifolium</i> sp.	Clover	N
<i>Xanthium strumarium</i> L.	Cocklebur	N
<i>Xylococcus bicolor</i> Nutt.	Mission manzanita	N
<i>Yucca schidigera</i> K.E. Ortgies	Mohave yucca	N
<i>Zigadenus fremontii</i> (Torrey) S. Watson	Star-lily	N

HABITATS

- N = Native to locality
I = Introduced species from outside locality

APPENDIX 3b
WILDLIFE SPECIES OBSERVED/DETECTED ON THE CARMEL MOUNTAIN PROJECT SITE

Common Name	Scientific Name	Status
<u>Fairy Shrimp</u> (Nomenclature from Eriksen and Belk 1999)		
San Diego fairy shrimp	<i>Branchinecta sandiegonensis</i>	FE, MSCP, *
<u>Amphibians</u> (Nomenclature from Crother 2001 and Crother et al. 2003)		
Western spadefoot	<i>Spea hammondi</i>	CSC
Pacific treefrog	<i>Pseudacris regilla</i>	
<u>Reptiles</u> (Nomenclature from Crother 2001 and Crother et al. 2003)		
Two-striped garter snake	<i>Thamnophis hammondi</i>	*
San Diego horned lizard	<i>Phrynosoma coronatum blainvillii</i>	CSC,*,MSCP
Western fence lizard	<i>Sceloporus occidentalis</i>	
Side-blotched lizard	<i>Uta stansburiana</i>	
Belding's orange-throated whiptail	<i>Aspidoscelis hyperythra beldingi</i>	CSC,MSCP
Northern Red diamond rattlesnake	<i>Crotalus ruber</i>	CSC
<u>Birds</u> (Nomenclature from American Ornithologists' Union 1998 and Unitt 1984)		
Turkey vulture	<i>Cathartes aura</i>	
White-tailed kite	<i>Elanus leucurus</i>	CFP, *
Northern harrier	<i>Circus cyaneus hudsonius</i>	CSC,MSCP
Cooper's hawk	<i>Accipiter cooperi</i>	CSC,MSCP
Red-shouldered hawk	<i>Buteo lineatus elegans</i>	
Red-tailed hawk	<i>Buteo jamaicensis</i>	
American kestrel	<i>Falco sparverius</i>	
California quail	<i>Callipepla californica californica</i>	
Killdeer	<i>Charadrius vociferus vociferus</i>	
Mourning dove	<i>Zenaida macroura marginella</i>	
Rock dove	<i>Columbina livia</i>	
Greater roadrunner	<i>Geococcyx californianus</i>	
Western burrowing owl	<i>Athene cunicularia hypugaea</i>	CSC,MSCP
White-throated swift	<i>Aeronautes saxatalis</i>	
Anna's hummingbird	<i>Calypte anna</i>	

APPENDIX 3b
WILDLIFE SPECIES OBSERVED/DETECTED ON THE CARMEL MOUNTAIN PROJECT SITE
(continued)

Common Name	Scientific Name	Status
Rufous hummingbird	<i>Selasphorus rufus</i>	
Nuttall's woodpecker	<i>Picoides nuttallii</i>	
Pacific slope flycatcher	<i>Empidonax difficilis</i>	
Ash-throated flycatcher	<i>Myiarchus cinerascens cinerascens</i>	
Cassin's kingbird	<i>Tyrannus vociferans vociferans</i>	
Western kingbird	<i>Tyrannus verticalis</i>	
California horned lark	<i>Eremophila alpestris actia</i>	CSC
Cliff swallow	<i>Hirundo pyrrhonota tachina</i>	
Western scrub-jay	<i>Aphelocoma californica</i>	
Common raven	<i>Corvus corax clarionensis</i>	
Loggerhead shrike	<i>Lanius ludovicianus</i>	CSC
Bushtit	<i>Psaltriparus minimus minimus</i>	
Bewick's wren	<i>Thyromanes bewickii</i>	
House wren	<i>Troglodytes aedon parkmanii</i>	
Northern mockingbird	<i>Mimus polyglottos polyglottos</i>	
California thrasher	<i>Toxostoma redivivum redivivum</i>	
Wrentit	<i>Chamaea fasciata henshawi</i>	
Blue-gray gnatcatcher	<i>Polioptila caerulea</i>	
Coastal California gnatcatcher	<i>Polioptila californica californica</i>	FT,CSC,MSCP
Lesser goldfinch	<i>Carduelis psaltria hesperophilus</i>	
Lawrence's goldfinch	<i>Carduelis lawrencei</i>	
House finch	<i>Carpodacus mexicanus frontalis</i>	
Orange-crowned warbler	<i>Vermivora celata</i>	
Yellow-rumped warbler	<i>Dendroica coronata</i>	
Common yellowthroat	<i>Geothlypis trichas</i>	
Black-headed grosbeak	<i>Pheucticus melanocephalus maculatus</i>	
Spotted towhee	<i>Pipilo maculatus</i>	
California towhee	<i>Pipilo crissalis</i>	
Bell's sage sparrow	<i>Amphispiza belli belli</i>	CSC
Southern California rufous-crowned sparrow	<i>Aimophila ruficeps canescens</i>	CSC,MSCP
Grasshopper sparrow	<i>Ammodramus savannarum perpallidus</i>	MSCP

APPENDIX 3b
WILDLIFE SPECIES OBSERVED/DETECTED ON THE CARMEL MOUNTAIN PROJECT SITE
(continued)

Common Name	Scientific Name	Status
Song sparrow	<i>Melospiza melodia</i>	
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	
Dark-eyed junco	<i>Junco hyemalis</i>	
Western meadowlark	<i>Sturnella neglecta</i>	
Oriole	<i>Icterus</i> spp.	
<u>Mammals</u> (Nomenclature from Jones et al. 1997)		
California ground squirrel	<i>Spermophilus beecheyi</i>	
Southern pocket gopher	<i>Thomomys umbrinus</i> (= <i>bottae</i>)	
Pacific (= agile) kangaroo rat	<i>Dipodomys agilis</i>	
Deer mouse	<i>Peromyscus maniculatus</i>	
Woodrat	<i>Neotoma</i> spp.	
San Diego desert woodrat	<i>Neotoma lepida intermedia</i>	CSC
Brush rabbit	<i>Sylvilagus bachmani</i>	
White-footed mouse	<i>Peromyscus</i> sp.	
Coyote	<i>Canis latrans</i>	
Gray fox	<i>Urocyon cinereoargenteus</i>	
Mountain lion	<i>Felis concolor</i>	CFP, MSCP
Southern mule deer	<i>Odocoileus hemionus fuliginata</i>	MSCP

STATUS

- CFP = California fully protected species
CSC = California Department of Fish and Game species of special concern
FE = Listed as endangered by the federal government
FT = Listed as threatened by the federal government
MSCP = Multiple Species Conservation Program covered species
* = Taxa listed with an asterisk fall into one or more of the following categories:
- Taxa considered endangered or rare under Section 15380(d) of CEQA guidelines
 - Taxa that are biologically rare, very restricted in distribution, or declining throughout their range
 - Population(s) in California that may be peripheral to the major portion of a taxon's range, but which are threatened with extirpation within California

APPENDIX 3b
WILDLIFE SPECIES OBSERVED/DETECTED ON THE CARMEL MOUNTAIN PROJECT SITE
(continued)

- Taxa closely associated with a habitat that is declining in California at an alarming rate (e.g., wetlands, riparian, old growth forests, desert aquatic systems, native grasslands)

APPENDIX 3c
SENSITIVE PLANT SPECIES OBSERVED ON THE CARMEL MOUNTAIN PRESERVE

Species	State/Federal Status	CNPS List	CNPS Code	Typical Habitat/Comments
<i>Adolphia californica</i> California adolphia	-/-	2	1-2-1	Chaparral/observed on-site
<i>Arctostaphylos glandulosa</i> ssp. <i>crassifolia</i> Del Mar manzanita	-/FE	1B	3-3-2	Coastal chaparral/observed-on site
<i>Brodiaea orcuttii</i> Orcutt's brodiaea	-/-	1B	1-3-2	Closed-cone coniferous forest, meadows, cismontane wood-land, valley and foothill grass-land, vernal pools/observed on-site
<i>Calandrinia maritima</i> Seaside calandrinia	-/-	4	1-2-1	Coastal bluff scrub, valley and foothill grassland/observed on-site
<i>Ceanothus verrucosus</i> Wart-stemmed ceanothus	-/-	2	1-2-1	Chaparral
<i>Comarostaphylis diversifolia</i> ssp. <i>diversifolia</i> Summer holly	-/-	1B	2-2-2	Chaparral/observed on-site
<i>Coreopsis maritima</i> Sea dahlia	-/-	2	2-2-1	Coastal sage scrub/observed on-site
<i>Dichondra occidentalis</i> Western dichondra	-/-	4	1-2-1	Chaparral, cismontane wood-land, coastal sage scrub, valley and foothill grassland/observed on-site
<i>Dudleya blochmaniae</i> ssp. <i>brevifolia</i> (= <i>Dudleya brevifolia</i>) Short-leaved dudleya	CE/-	1B	3-3-3	Chaparral, coastal sage scrub (Torrey sandstone)/observed on-site
<i>Ferocactus viridescens</i> Coast barrel cactus	-/-	2	1-3-1	Chaparral, coastal sage scrub, valley and foothill grassland/observed on-site
<i>Lessingia filaginifolia</i> var. <i>filaginifolia</i> (= <i>Corethrogyne filaginifolia</i> var. <i>linifolia</i>) Del Mar Mesa sand aster	-/-	1B	3-2-3	Chaparral, coastal sage scrub/observed on-site
<i>Muilla clevelandii</i> San Diego goldenstar	-/-	1B	2-2-2	Chaparral, coastal sage scrub, valley and foothill grassland, vernal pools
<i>Ophioglossum californicum</i> (= <i>Ophioglossum lusitanicum</i> ssp. <i>californicum</i>) California adder's-tongue fern	-/-	4	1-2-2	Clay mesa soils/observed on-site
<i>Pinus torreyana</i> ssp. <i>torreyana</i> Torrey pine	-/-	1B	3-2-3	Closed-cone coniferous forest/observed on-site

APPENDIX 3c
SENSITIVE PLANT SPECIES OBSERVED ON THE CARMEL MOUNTAIN PRESERVE
(continued)

Species	State/Federal Status	CNPS List	CNPS Code	Typical Habitat/Comments
<i>Quercus dumosa</i> Nuttall's scrub oak	--	1B	2-3-2	Coastal chaparral

SENSITIVITY CODES

FEDERAL CANDIDATES AND LISTED PLANTS

FE = Federally listed, endangered
 FT = Federally listed, threatened
 FPE = Federally proposed endangered
 FPT = Federally proposed threatened

STATE LISTED PLANTS

CE = State listed, endangered
 CR = State listed, rare
 CT = State listed, threatened

CALIFORNIA NATIVE PLANT SOCIETY

LISTS

1A = Species presumed extinct.
 1B = Species rare, threatened, or endangered in California and elsewhere. These species are eligible for state listing.
 2 = Species rare, threatened, or endangered in California but which are more common elsewhere. These species are eligible for state listing.
 3 = Species for which more information is needed. Distribution, endangerment, and/or taxonomic information is needed.
 4 = A watch list of species of limited distribution. These species need to be monitored for changes in the status of their populations.

R-E-D CODES

R (Rarity)

1 = Rare, but found in sufficient numbers and distributed widely enough that the potential for extinction is low at this time.
 2 = Occurrence confined to several populations or to one extended population.
 3 = Occurrence limited to one or a few highly restricted populations, or present in such small numbers that it is seldom reported.

E (Endangerment)

1 = Not endangered
 2 = Endangered in a portion of its range
 3 = Endangered throughout its range

D (Distribution)

1 = More or less widespread Outside California
 2 = Rare outside California
 3 = Endemic to California

APPENDIX 3d
Descriptions of Sensitive Species Occurring
on the Carmel Mountain Preserve and Not Covered by the MSCP

California adolphia (*Adolphia californica*). California adolphia is a CNPS List 2 species in the buckthorn family (Rhamnaceae). This species generally occurs in Diegan coastal sage scrub or near the edge of chaparral, in dry locales with shrubs four to five feet tall. On Carmel Mountain, California adolphia is present in the southern maritime chaparral, on the southeastern portion of the Preserve. The population on the Preserve has been disturbed by road grading and trash dumping. This shrub flowers from December to April and loses its leaves in late summer and fall, making it difficult to find. Its spiny stems are identifiable at close range year-round, however. It is associated with San Miguel and Friant soils (Reiser 2001). Its geographic range extends from San Diego County south into Baja California. In San Diego County, it is found from the Carlsbad area south into the Proctor Valley and Otay region (Beauchamp 1986).

South coast saltbush (*Atriplex pacifica*). South coast saltbush is an annual herb and a member of the Chenopodiaceae (goosefoot) family. It is a CNPS List 1B species. This species is found within coastal bluff scrub and coastal sage scrub from Ventura County south to Baja California, Mexico. South coast saltbush superficially resembles the introduced Australian saltbush (*Atriplex semibaccata*), common throughout southern California.

Seaside calandrinia (*Calandrinia maritima*). Seaside calandrinia is a CNPS List 4 species, with low numbers throughout its range along the coast from Santa Barbara County southward into Baja California, Mexico, and on the Channel Islands. This succulent annual herb in the purslane family (Portulacaceae) flowers from March through May. It is typically found on sandy bluffs and openings in coastal sage scrub flats near the beach. It has been mapped on Gaviota fine sandy loam and Terrace Escarpment soils (Reiser 2001). Because the species inhabits coastal environments, development has reduced the number of populations throughout its range. On Carmel Mountain Preserve, this species is present in southern maritime chaparral north and northwest of Carmel Mountain.

Summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*). Summer holly is a CNPS List 1B species. This evergreen shrub in the heath family (Ericaceae) reaches heights of 15 feet and produces a small white flower from April to June (Munz 1974). Summer holly is found in the chaparral in Orange, Riverside, and San Diego Counties, as well as Baja California, Mexico. In San Diego County it generally occurs at low elevations in chaparral communities near the coast. Summer holly is threatened by development and gravel mining (CNPS 2001). It has been documented as occurring on Carmel Mountain Preserve, but its location has not been mapped.

Sea dahlia (*Coreopsis maritima*). Sea dahlia is a CNPS List 2 species. This perennial herb in the sunflower family (Asteraceae) has semi-succulent leaves and reaches two feet in height. It flowers from March to June. It typically grows on coastal bluffs and dunes below 200 feet elevation in coastal strand or coastal sage scrub. Its range extends along the coast from Encinitas in San Diego County south to near San Quentin, Baja California, Mexico. On Carmel Mountain Preserve, sea dahlia is present on north slopes within southern maritime chaparral. The population is currently presumed stable, due to lack of disturbance in that area of the Preserve. Threats to the species include loss of habitat and erosion of remaining sandstone seabluff habitat.



Photograph A3d-1. Sea Dahlia



Photograph A3d-2.
Sea Dahlia Flowers

Western dichondra (*Dichondra occidentalis*). Western dichondra is a CNPS List 4 species, indicating that it has limited distribution or is infrequent throughout its range. Its range extends from Ventura County south into Baja California, Mexico, including the Channel Islands. In San Diego County, it is known from Agua Hedionda south to Point Loma and inland to Poway, Otay Mountain, and the Tijuana Hills (Beauchamp 1986). This small perennial herb in the morning-glory family (Convolvulaceae) flowers from March to May. It often grows almost completely hidden under shrubs or trees in coastal sage scrub and chaparral, or among rocky outcrops in grasslands. It grows primarily in dry sandy soils including Heuerhuero soils and Hambright gravelly clay loam (Reiser 2001). On Carmel Mountain Preserve, this



Photograph A3d-3. Western Dichondra

species is found in southern maritime chaparral, adjacent to and within the 1986 burned area. The numbers of western dichondra are in a slow decline in southern California because habitat is being lost to development and weeds are invading native plant communities.

California adder's-tongue fern (*Ophioglossum californicum*). California adder's-tongue fern is a CNPS List 4 whose range extends from the Sierra Nevada foothills to southern California and southward into Baja California, Mexico. In San Diego County, the fern has been reported from Kearny Mesa, Olivenhain, Proctor Valley, and Escondido (Beauchamp 1986). This perennial rhizomatous herb typically occurs on grassy slopes and near vernal pools and seeps, in coastal and foothill locations below 900 feet elevation. The California adder's-tongue fern is easily observed during the springtime, but becomes inconspicuous later in the season. This species is associated with vernal pools and other seasonal wetlands and wet meadows on the Preserve.

Nuttall's scrub oak (*Quercus dumosa*). Nuttall's scrub oak is a member of the Fagaceae family. This evergreen shrub is a CNPS *Inventory* (CNPS 2001) List 1B species that occurs in Santa Barbara, Orange, and San Diego Counties as well as in Baja California, Mexico. Nuttall's scrub oak is found within chaparral and coastal sage scrub vegetation on sandy or clay loam soils. This species occurs abundantly within southern maritime chaparral on the Preserve.

Two-striped garter snake (*Thamnophis hammondi*). The two-striped garter snake is a sensitive species that may grow as long as 36 inches though 18 to 24 inches is more usual. Its dorsal scales are keeled, which breaks up the reflection of light and results in a dull luster. The overall color is olive drab with a single yellowish stripe running down each side of the body. Patterned into the dorsal coloration are four rows of small, dark spots. The belly is dull yellow, or sometimes salmon colored. The two-striped garter snake ranges in coastal California from the vicinity of Salinas south to El Rosario in Baja California, Mexico. They are normally found in or near permanent fresh water, inhabiting streams, ponds, and lakes throughout their range. They are often found even in temporary bodies of water such as vernal pools. It is the most common snake in southern California, and it is not unusual to encounter several individuals at a time. Activity is most common around dusk and in the early evening. Adults feed on frogs, tadpoles, toads, insect larvae, fish, fish eggs, and earthworms. The two-striped garter snake is ovoviviparous. Breeding commences in April and May and continues throughout the summer months. Gestation is approximately nine weeks. As many as 25 young may be born, though 12 to 13 is more common.



Photograph A3d-4. Red Diamond Rattlesnake at Carmel Mountain

Northern red diamond rattlesnake (*Crotalus ruber*). The northern red diamond rattlesnake is a CDFG species of special concern. This species occurs below 1,200 meters (4,000 feet) on both sides of the Peninsular Ranges of southwestern California in coastal sage scrub, desert scrub, open chaparral, woodland, and grassland habitats, as well as agricultural fields (Stebbins 1985). This snake is commonly found in areas with rock outcrops. Population declines in the red diamond rattlesnake are generally attributable to impacts related to the increased development near habitat in which this snake is found.

White-tailed kite (*Elanus leucurus*). The white-tailed kite is a California fully protected species that occurs in coastal lowland areas from Oregon to northern Baja California, Mexico (National Geographic Society 1983). This resident bird nests in riparian woodlands, live oaks, or sycamore groves which border grassland or open fields (Unitt 1984 and 2004). The white-tailed kite forages over open areas and grasslands feeding primarily on small rodents, in particular the California vole or meadow mouse (Unitt 2004), and insects (National Geographic Society 1983). This species is known to roost in large communal groups (Unitt 1984 and 2004). White-tailed kite populations in southern California have declined due to the loss of grassland foraging habitat to urbanization.

Coastal subspecies of the horned lark (*Eremophila alpestris actia*). The coastal subspecies of the horned lark is a CDFG species of special concern. The horned lark (*E. alpestris*) ranges throughout North America; however, the coastal subspecies occupies the coastal slope of San Diego County, extending east to Montezuma Valley (Ranchita), Mason Valley, and Jacumba (Unitt 2004). Other subspecies and hybrids with other subspecies have been encountered in San Diego County (Unitt 2004). Horned larks occur in the coastal strand, arid grasslands, and sandy desert floors of San Diego County year round (Unitt 2004). Decline of this species is generally attributed to urbanization and human disturbance.

Blue-gray gnatcatcher (*Poliophtila caerulea*). The blue-gray gnatcatcher is on the sensitive species list for the City of San Diego. The blue-gray gnatcatcher is distributed throughout Mexico and the U.S., excluding northern plains states and the northwest. Locally, this species is a fairly common migrant and winter visitor and a rare and localized summer resident. The blue-gray gnatcatcher winters in dense riparian undergrowth, weedy/brushy agricultural areas, thickets in desert washes, and occasionally chaparral. It breeds in foothill chaparral, desert-edge scrub, and mesquite thickets. Brood-parasitism by brown-headed cowbirds is one contributing reason to the decline of this species.

Loggerhead shrike (*Lanius ludovicianus*). The loggerhead shrike is a CDFG species of special concern. This species inhabits most of the continental U.S. and Mexico and is a year-round resident of southern California. The loggerhead shrike prefers open habitat with perches for hunting and fairly dense shrubs for nesting (Small 1994). In southern California, this bird inhabits grasslands, agricultural fields, chaparral, and desert scrub (Unitt 1984). Loggerhead shrikes feed on small reptiles and insects that they often impale on sticks or thorns before eating (Robbins et al. 1983). Loggerhead shrike populations are declining, likely due to urbanization and loss of habitat.

Bell's sage sparrow (*Amphispiza belli belli*). Bell's sage sparrow is a CDFG species of special concern. Bell's sage sparrow is an uncommon to locally fairly common resident along the extreme west coast of California. Its breeding range is along the coastal slopes from Trinity County south into northwestern Baja California, Mexico. Locally, it can be found in the interior chaparral and coastal sage scrub habitats, especially dense stands of chamise chaparral (Small 1994). This race is essentially sedentary. Male Bell's sage sparrows show high breeding territory tenacity, even when the habitat is altered dramatically (Ehrlich et al. 1988). This species feeds primarily on spiders, insects, and seeds while breeding, and seeds during the winter.

Grasshopper sparrow (*Ammodramus savannarum*). Although they have no official status with resource agencies, grasshopper sparrows are considered locally uncommon. In addition, the County gives "special attention" to this species during the development of the North County MSCP as reported in their update on the plan published on their website (County of San Diego 2001). This species has a patchy distribution within grasslands along coastal California and the foothills of the Sierra Nevadas. Grasshopper sparrows are semi-colonial and are locally rare throughout southern California with the numbers of grasshopper sparrows varying annually. Grasshopper sparrows are a localized summer resident in San Diego County and very rare in winter (Unitt 1984). This species was observed adjacent to the Preserve during surveys in 1994 and probably occurs on the Preserve, although its current status is unknown.

San Diego black-tailed jackrabbit (*Lepus californicus bennetti*). The San Diego black-tailed jackrabbit is a CDFG species of special concern. This species can be found throughout southern California, with the exception of the high-altitude mountains. The black-tailed jackrabbit is strictly herbivorous, preferring habitat with ample forage such as grasses and forbs. The San Diego black-tailed jackrabbit breeds throughout the year with the greatest number of births occurring from April through May. This species is generally solitary, except when mating and raising young (Zeiner et al. 1990).

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APPENDIX 3e
SENSITIVE WILDLIFE SPECIES OBSERVED ON THE CARMEL MOUNTAIN PRESERVE

Species	Status	Habitat
<u>Invertebrates</u> (Nomenclature from Eriksen and Belk 1999)		
San Diego fairy shrimp <i>Branchinecta sandiegonensis</i>	FE, MSCP, *	Vernal pools.
<u>Amphibians</u> (Nomenclature from Crother 2001 and Crother et al. 2003)		
Western spadefoot <i>Spea hammondi</i>	CSC	Vernal pools, floodplains, and alkali flats within areas of open vegetation.
<u>Reptiles</u> (Nomenclature from Crother 2001 and Crother et al. 2003)		
Two-striped garter snake <i>Thamnophis hammondi</i>	CSC, *	Permanent freshwater streams with rocky bottoms. Mesic areas.
San Diego horned lizard <i>Phrynosoma coronatum blainvillii</i>	CSC, MSCP, *	Chaparral, coastal sage scrub with fine, loose soil. Partially dependent on harvester ants for forage.
Belding's orangethroat whiptail <i>Aspidoscelis hyperythra beldingi</i>	CSC, MSCP	Chaparral, coastal sage scrub with coarse sandy soils and scattered brush.
Northern red diamond rattlesnake <i>Crotalus ruber</i>	CSC	Desert scrub and riparian, coastal sage scrub, open chaparral, grassland, and agricultural fields.
<u>Birds</u> (Nomenclature from American Ornithologists' Union 1998 and Unitt 1984)		
White-tailed kite (nesting) <i>Elanus leucurus</i>	CFP, *	Nest in riparian woodland, oaks, sycamores. Forage in open, grassy areas. Year-round resident.
Northern harrier (nesting) <i>Circus cyaneus</i>	CSC, MSCP	Coastal lowland, marshes, grassland, agricultural fields. Migrant and winter resident, rare summer resident.
Cooper's hawk (nesting) <i>Accipiter cooperi</i>	CSC, MSCP	Mature forest, open woodlands, wood edges, river groves. Parks and residential areas. Migrant and winter visitor.
Western burrowing owl (burrow sites) <i>Athene cunicularia hypugaea</i>	CSC, MSCP	Grassland, agricultural land, coastal dunes. Require rodent burrows. Declining resident.
California horned lark <i>Eremophila alpestris actia</i>	CSC	Sandy shores, mesas, disturbed areas, grasslands, agricultural lands, sparse creosote bush scrub.

APPENDIX 3e
SENSITIVE WILDLIFE SPECIES OBSERVED ON THE CARMEL MOUNTAIN PRESERVE
(continued)

Species	Status	Habitat
Coastal California gnatcatcher <i>Polioptila californica californica</i>	FT, CSC, MSCP	Coastal sage scrub, maritime succulent scrub. Resident.
Loggerhead shrike <i>Lanius ludovicianus</i>	CSC	Open foraging areas near scattered bushes and low trees.
Southern California rufous-crowned sparrow <i>Aimophila ruficeps canescens</i>	CSC, MSCP	Coastal sage scrub, chaparral, grassland. Resident.
Bell's sage sparrow <i>Amphispiza belli belli</i>	CSC	Chaparral, coastal sage scrub. Localized resident.
Grasshopper sparrow (nesting) <i>Ammodramus savannarum</i>	MSCP	Tall grass areas. Localized summer resident, rare in winter.
<u>Mammals</u> (Nomenclature from Jones et al. 1997)		
San Diego black-tailed jackrabbit <i>Lepus californicus bennettii</i>	CSC	Open areas of scrub, grasslands, agricultural fields.
Mountain lion <i>Felis concolor</i>	CFP, MSCP	Many habitats.
Southern mule deer <i>Odocoileus hemionus fuliginata</i>	MSCP	Many habitats.

STATUS CODES

Listed/Proposed

FE = Listed as endangered by the federal government
 FT = Listed as threatened by the federal government
 SE = Listed as endangered by the state of California

Other

CFP = California fully protected species
 CSC = California Department of Fish and Game species of special concern
 MSCP = Multiple Species Conservation Program covered species
 * = Taxa listed with an asterisk fall into one or more of the following

categories:

- Taxa considered endangered or rare under Section 15380(d) of CEQA guidelines
- Taxa that are biologically rare, very restricted in distribution, or declining throughout their range
- Population(s) in California that may be peripheral to the major portion of a taxon's range, but which are threatened with extirpation within California

APPENDIX 3e
SENSITIVE WILDLIFE SPECIES OBSERVED ON THE CARMEL MOUNTAIN PRESERVE
(continued)

- Taxa closely associated with a habitat that is declining in California at an alarming rate (e.g., wetlands, riparian, old growth forests, desert aquatic systems, native grasslands)

APPENDIX 3f
PLANT SPECIES OBSERVED AT THE DEL MAR MESA PRESERVE

Scientific Name	Common Name	Origin
<i>Acanthomintha coronatum</i> (Thurber) Barkworth	Giant needlegrass	N
<i>Adenostoma fasciculatum</i> Hook. & Arn.	Chamise	N
<i>Adiantum jordani</i> K. Mull.	California maiden-hair fern	N
<i>Adolphia californica</i> Wats.	California adolphia, spineshrub	N
<i>Allium praecox</i> Bdg.	Wild onion	I
<i>Amblyopappus pusillus</i> Hook. & Arn.	Pineapple weed	N
<i>Ambrosia psilostachya</i> DC	Western ragweed	N
<i>Anagallis arvensis</i> L.	Scarlet pimpernel, poor-man's weatherglass	I
<i>Antirrhinum nuttallianum</i> Benth. in DC.	Snapdragon	N
<i>Apiastrum angustifolium</i> Nutt. in Torrey & A. Gray	Wild-celery	N
<i>Arctostaphylos glandulosa</i> Eastw. ssp. <i>crassifolia</i> (Jepson) Wells	Del Mar manzanita, Costa Baja manzanita	N
<i>Artemisia californica</i> Less.	California sagebrush	N
<i>Artemisia palmeri</i> A. Gray	San Diego sagewort, Palmer sagewort	N
<i>Atriplex semibaccata</i> R.Br.	Australian saltbush	I
<i>Avena barbata</i> Link	Slender wild oats	N
<i>Avena fatua</i> L.	Wild oats	N
<i>Baccharis pilularis</i> DC.	Coyote bush	N
<i>Baccharis salicifolia</i> (Ruiz Lopez & Pavón) Pers.	Mule fat, seep-willow	N
<i>Baccharis sarothroides</i> A. Gray	Broom baccharis	N
<i>Bothriochloa barbinodis</i> (Lag.) Herter	Cane bluestem	N
<i>Brassica nigra</i> L.	Black mustard	I
<i>Brodiaea orcuttii</i> (E. Greene) Baker	Orcutt's brodiaea	N
<i>Bromus diandrus</i> Roth.	Ripgut brome	I
<i>Bromus hordaceus</i> L.	Smooth brome	I
<i>Bromus madritensis</i> L. ssp. <i>rubens</i> (L.) Husnot	Foxtail chess	I
<i>Calandrinia ciliata</i>	Red maids	N
<i>Callitriche marginata</i> Torrey	Water-starwort	N
<i>Calochortus splendens</i> Benth.	Lilac mariposa	N
<i>Calystegia macrostegia</i> ssp. <i>arida</i> (E. Greene) Brum.	Finger-leaf morning-glory	N
<i>Camissonia bistorta</i> (Torrey & A. Gray) Raven	California sun cup	N
<i>Cardamine californica</i> (Torrey & A. Gray) E. Greene	Milk maids, tooth wort	N

APPENDIX 3f
PLANT SPECIES OBSERVED AT THE DEL MAR MESA PRESERVE
(continued)

Scientific Name	Common Name	Origin
<i>Cardionema ramosissimum</i> (Weinm.) Nelson & J.F. Macbr.	Tread lightly	N
<i>Carpobrotus edulis</i> (L.) Bolus.	Hottentot fig	I
<i>Castilleja exserta</i> (A.A. Heller) Chuang & Heckard	Purple owl's clover	N
<i>Castilleja foliolosa</i> Hook. & Arn.	Woolly Indian paintbrush	N
<i>Ceanothus tomentosus</i> C. Parry	Coast blue lilac	N
<i>Ceanothus verrucosus</i> Nutt.	Wart-stemmed ceanothus	N
<i>Centaurea melitensis</i> L.	Tocolote, star-thistle	I
<i>Centaurium venustum</i> (A. Gray) Rob.	Canchalagua	N
<i>Chaenactis glabriuscula</i> DC.	Yellow pincushion	N
<i>Chamaesyce polycarpa</i> (Benth.) Millsp.	Spurge	N
<i>Chenopodium ambrosioides</i> L.	Mexican tea	I
<i>Chlorogalum parviflorum</i> Wats.	Amole, soap plant	N
<i>Chorizanthe fimbriata</i> Nutt.	Fringed spineflower	N
<i>Chrysanthemum coronarium</i> L.	Garland, crown daisy	I
<i>Claytonia perfoliata</i> Willd.	Miner's lettuce	N
<i>Cneoridium dumosum</i> (Nutt.) Baillon	Bushrue	N
<i>Collinsia heterophylla</i> Buist.	Chinese houses	N
<i>Comarostaphylis diversifolia</i> ssp. <i>diversifolia</i> (Parry) E. Greene	Summer holly	N
<i>Conyza canadensis</i> (L.) Cronq.	Horseweed	N
<i>Cordylanthus rigidus</i> (Benth.) Jepson ssp. <i>setigerus</i> Chuang & Heckard	Thread-leaved bird's-beak	N
<i>Cortaderia jubata</i> (Lemoine) Stapf	Pampas grass	I
<i>Cotula coronopifolia</i> L.	Brass-buttons	I
<i>Crassula aquatica</i> (L.) Schoen.	Stone-crop	N
<i>Crassula connata</i> (Ruiz Lopez & Pavon) A. Berger	Pygmy-weed	N
<i>Cryptantha intermedia</i> (A. Gray) E. Greene	Nievita	N
<i>Cucurbita foetidissima</i> Kunth	Calabazilla	N
<i>Cynara cardunculus</i> L.	Cardoon	I
<i>Cynodon dactylon</i> (L.) Pers.	Bermuda grass	I
<i>Cyperus alternifolius</i> L.	Umbrella-plant	I
<i>Daucus pusillus</i> Michx	Rattlesnake weed	N

APPENDIX 3f
PLANT SPECIES OBSERVED AT THE DEL MAR MESA PRESERVE
(continued)

Scientific Name	Common Name	Origin
<i>Deschampsia danthonioides</i>	Annual hairgrass	N
<i>Dichelostemma capitatum</i> Alph. Wood	Blue dicks	N
<i>Dichondra occidentalis</i> House	Western dichondra	N
<i>Distichlis spicata</i> (L.) E. Greene	Saltgrass	N
<i>Downingia cuspidata</i> Jepson	Downingia	N
<i>Dudleya lanceolata</i> (Nutt.) Britt. & Rose	Live-for-ever	N
<i>Dudleya pulverulenta</i> (Nutt.) Britt. & Rose ssp. <i>pulverulenta</i>	Chalk lettuce	N
<i>Eleocharis macrostachya</i> Britton	Pale spikerush	N
<i>Emmenanthe penduliflora</i> Benth.	Whispering bells	N
<i>Encelia californica</i> Nutt.	Common encelia	N
<i>Epilobium canum</i> (E. Greene) Raven ssp. <i>canum</i>	California-fuchsia, zauschneria	N
<i>Eremocarpus setigerus</i> (Hook.) Benth.	Dove weed	N
<i>Eriogonum fasciculatum</i> Benth. var. <i>fasciculatum</i>	California buckwheat	N
<i>Eriophyllum confertiflorum</i> (DC.) A. Gray var. <i>confertiflorum</i>	Golden-yarrow	N
<i>Erodium botrys</i> (Cav.) Bertol.	Pin-clover	I
<i>Erodium cicutarium</i> (L.) L. Her.	White-stemmed filaree	I
<i>Eryngium aristulatum</i> Jepson var. <i>parishii</i> (C. & R.) Jepson	San Diego button-celery	N
<i>Eschscholzia californica</i> Cham.	California poppy	N
<i>Eucalyptus</i> spp.	Eucalyptus	I
<i>Ferocactus viridescens</i> (Torrey & A. Gray) Britt. & Rose	Coast barrel cactus	N
<i>Filago gallica</i> L.	Narrow-leaf herba impia	I
<i>Foeniculum vulgare</i> Mill.	Fennel	I
<i>Galium angustifolium</i> Nutt. <i>angustifolium</i>	Narrow-leaf bedstraw	N
<i>Galium aparine</i> L.	Goose grass	I
<i>Gastridium ventricosum</i> (Gouan) Schinz & Thell.	Nit grass	I
<i>Gilia</i> sp.	Gilia	N
<i>Gnaphalium bicolor</i> Bioletti	Bicolored cudweed	N
<i>Gnaphalium californicum</i> DC.	Green everlasting	N
<i>Harpagonella palmeri</i> A. Gray	Palmer's grappling hook	N
<i>Hazardia squarrosa</i> (Hook. & Arn.) E. Greene	Sawtoothed goldenbush	N

APPENDIX 3f
PLANT SPECIES OBSERVED AT THE DEL MAR MESA PRESERVE
(continued)

Scientific Name	Common Name	Origin
<i>Helianthemum scoparium</i> Nutt.	Peak rush-rose	N
<i>Hemizonia fasciculata</i> (DC.) Torrey & A. Gray	Golden tarplant	N
<i>Heteromeles arbutifolia</i> (Lindley) Roemer	Toyon, Christmas berry	N
<i>Heterotheca grandiflora</i> Nutt.	Telegraph weed	N
<i>Hypochaeris glabra</i> L.	Smooth cat's-ear	I
<i>Isocoma menziesii</i> (Hook. & Arn.) G. Nesom	Coast goldenbush	N
<i>Isomeris arborea</i> Nutt.	Bladderpod	N
<i>Jepsonia parryi</i> (Torrey) Small	Mesa saxifrage	N
<i>Juncus bufonius</i> L.	Toad rush	N
<i>Juncus dubius</i> Engelm.	Mariposa rush	N
<i>Juncus mexicanus</i> Willd.	Mexican rush	N
<i>Lactuca serriola</i> L.	Prickly lettuce	I
<i>Lamarckia aurea</i> (L.) Moench.	Goldentop	I
<i>Lasthenia californica</i> Lindley	Goldfields	N
<i>Layia platyglossa</i> (F. & M.) A. Gray	Tidy-tips	N
<i>Lepidium nitidum</i> Torrey & A. Gray var. <i>nitidum</i>	Shining peppergrass	N
<i>Lessingia filaginifolia</i> (Hook. & Arn.) M.A. Lane var. <i>filaginifolia</i>	California-aster	N
<i>Leymus condensatus</i> (C. Presl) A. Love	Giant ryegrass	N
<i>Linanthus dianthiflorus</i> (Benth.) E. Greene	Ground-pink	N
<i>Linaria canadensis</i> (L.) Dum.-Cours	Blue toadflax	N
<i>Lomatium dasycarpum</i> (Torrey & A. Gray) Coult. & Rose ssp. <i>dasycarpum</i>	Lace parsnip	N
<i>Lonicera subspicata</i> Hook. & Arn. var. <i>denudata</i> Rehd.	Wild honeysuckle	N
<i>Lotus</i> sp.	Trefoil	N
<i>Lotus scoparius</i> (Nutt. in Torrey & A. Gray) Ottley var. <i>scoparius</i>	California broom	N
<i>Lotus strigosus</i> (Nutt.) E. Greene	Bishop's lotus	N
<i>Lupinus bicolor</i> Lindl.	Miniature lupine	N
<i>Lupinus succulentus</i> Koch	Arroyo lupine	N
<i>Lycium californicum</i> Nutt.	California box thorn	N
<i>Lythrum californicum</i> Torrey & A. Gray	California loosestrife	N

APPENDIX 3f
PLANT SPECIES OBSERVED AT THE DEL MAR MESA PRESERVE
(continued)

Scientific Name	Common Name	Origin
<i>Lythrum hyssopifolium</i> L.	Grass poly	N
<i>Malacothamnus fasciculatus</i> (Torrey & A. Gray) E. Greene	Chaparral mallow	N
<i>Malosma laurina</i> (Nutt.) Abrams	Laurel sumac	N
<i>Marah macrocarpus</i> (E. Greene) E. Greene	Wild cucumber	N
<i>Marrubium vulgare</i> L.	Horehound	I
<i>Melica imperfecta</i> Trin.	California melic	N
<i>Mesembryanthemum crystallinum</i> L.	Crystalline ice plant	I
<i>Mimulus aurantiacus</i> Curtis	Bush monkeyflower	N
<i>Mirabilis californica</i> A. Gray	Wishbone bush	N
<i>Muhlenbergia rigens</i> (Benth.) A. Hitchc.	Deergrass	N
<i>Muilla clevelandii</i> (Wats.) Hoover	San Diego goldenstar	N
<i>Muilla maritima</i> (Torrey) S. Watson	Common muilla	N
<i>Myosurus minimus</i> L.	Little mouse-tail	N
<i>Nassella lepida</i> (A. Hitchc.) Barkworth	Foothill needlegrass	N
<i>Nassella pulchra</i> (A. Hitchc.) Barkworth	Purple needlegrass	N
<i>Navarretia hamata</i> E. Greene	Hooked navarretia	N
<i>Nemophila menziesii</i> Hook. & Arn. var. <i>menziesii</i>	Baby blue-eyes	N
<i>Nicotiana glauca</i> Grah.	Tree tobacco	I
<i>Ophioglossum californicum</i> Prantl.	California adder's-tongue	N
<i>Opuntia littoralis</i> (Engelm.) Cockerell.	Shore cactus	N
<i>Opuntia prolifera</i> Engelm.	Cholla	N
<i>Oxalis albicans</i> Kunth ssp. <i>californica</i> (Abrams) Eiten.	California wood-sorrel	N
<i>Oxalis pes-caprae</i> L.	Bermuda buttercup	I
<i>Pectocarya linearis</i> (Ruis Lopez & Pavon) DC. ssp. <i>ferocula</i> (I.M. Johnston) Thorne	Comb-bur	N
<i>Pellaea mucronata</i> (D. Eaton) D. Eaton	Bird's-foot fern	N
<i>Pentagramma triangularis</i> ssp. <i>viscosa</i> (D. Eaton) G. Yatskievych, M.D. Windham & E. Wollenweber	Silverback fern	N
<i>Phacelia</i> sp.	Phacelia	N
<i>Pholistoma auritum</i> (Lindley) Lilja var. <i>auritum</i>	Fiesta flower	N

APPENDIX 3f
PLANT SPECIES OBSERVED AT THE DEL MAR MESA PRESERVE
(continued)

Scientific Name	Common Name	Origin
<i>Plantago erecta</i> Morris	Dot-seed plantain	N
<i>Plantago major</i> L.	Common plantain	I
<i>Platanus racemosa</i> Nutt.	Western sycamore	N
<i>Pogogyne abramsii</i> J. Howell	San Diego mesa mint	N
<i>Polypogon monspeliensis</i> (L.) Desf.	Annual beard grass	I
<i>Porophyllum gracile</i> Benth.	Odora	N
<i>Psilocarphus brevissimus</i> Nutt. var. <i>brevissimus</i>	Dwarf woolly-heads	N
<i>Psilocarphus tenellus</i> Nutt. var. <i>tenellus</i>	Woolly-heads	N
<i>Quercus agrifolia</i> Nee	Coast live oak, Encina	N
<i>Quercus dumosa</i> Nutt.	Nuttall's scrub oak	N
<i>Ranunculus californicus</i> Benth.	California buttercup	N
<i>Raphanus sativus</i> L.	Radish	I
<i>Rhamnus crocea</i> Nutt.	Spiny redberry	N
<i>Rhus integrifolia</i> (Nutt.) Brewer & Watson	Lemonadeberry	N
<i>Rhus ovata</i> Wats.	Sugar bush	N
<i>Ribes speciosum</i> Pursh.	Fuchsia-flowered gooseberry	N
<i>Rumex crispus</i> L.	Curly dock	I
<i>Salix gooddingii</i> C. Ball.	Goodding's black willow	N
<i>Salix lasiolepis</i> Benth.	Arroyo willow	N
<i>Salsola tragus</i> L.	Russian thistle, tumbleweed	I
<i>Salvia apiana</i> Jepson	White sage	N
<i>Salvia columbariae</i> Benth.	Chia	N
<i>Salvia mellifera</i> E. Greene	Black sage	N
<i>Sambucus mexicana</i> C. Presl	Blue elderberry	N
<i>Sanicula</i> sp.	Sanicle	N
<i>Schinus molle</i> L.	Peruvian pepper tree	I
<i>Scirpus californicus</i> (C.A. Mey.) Steudel.	California bulrush	N
<i>Selaginella bigelovii</i> L. Underw.	Bigelow clubmoss	N
<i>Selaginella cinerascens</i> Maxon	Ashy spike-moss	N
<i>Sidalcea malvaeflora</i> (DC.) Benth. ssp. <i>sparsifolia</i> C.L. Hitchc.	Checker mallow	N

APPENDIX 3f
PLANT SPECIES OBSERVED AT THE DEL MAR MESA PRESERVE
(continued)

Scientific Name	Common Name	Origin
<i>Silene gallica</i> L.	Windmill pink	I
<i>Sisymbrium irio</i> L.	London rocket	I
<i>Sisymbrium orientale</i> L.	Mustard	I
<i>Sisyrinchium bellum</i> Wats.	Blue-eyed-grass	N
<i>Solanum parishii</i> A.A. Heller	Parish's nightshade	N
<i>Sonchus asper</i> (L.) Hill ssp. <i>asper</i>	Prickly sow thistle	I
<i>Spergula arvensis</i> L. ssp. <i>arvensis</i>	Stickwort, starwort	I
<i>Spergularia villosa</i> (Pers.) Cambess.	Cleveland sand spurrey	I
<i>Stellaria media</i> (L.) Villars	Common chickweed	I
<i>Stephanomeria virgata</i> (Benth.) ssp. <i>virgata</i>	Slender stephanomeria	N
<i>Stylomecon heterophylla</i> (Benth.) G.C. Taylor	Wind poppy	N
<i>Toxicodendron diversilobum</i> (Torrey & A. Gray) E. Greene	Western poison oak	N
<i>Trifolium</i> sp.	Clover	N
<i>Urtica urens</i> L.	Dwarf nettle	I
<i>Viola pedunculata</i> Torrey & A. Gray	Johnny-jump-up	N
<i>Xanthium strumarium</i> L.	Cocklebur	N
<i>Xylococcus bicolor</i> Nutt.	Mission manzanita	N
<i>Yucca schidigera</i> K.E. Ortgies	Mohave yucca	N
<i>Zigadenus fremontii</i> (Torrey) S. Watson	Star-lily	N

OTHER TERMS

N = Native to locality

I = Introduced species from outside locality

APPENDIX 3g
WILDLIFE SPECIES OBSERVED/DETECTED ON THE DEL MAR MESA PRESERVE

Common Name	Scientific Name	Status
<u>Fairy Shrimp</u> (Nomenclature from Eriksen and Belk 1999)		
San Diego fairy shrimp	<i>Branchinecta sandiegonensis</i>	FE, MSCP, *
<u>Invertebrates</u> (Nomenclature from Mattoni 1990 and Opler and Wright 1999)		
Common or checkered white	<i>Pieris protodice</i>	
Sara orangetip	<i>Anthocaris sara</i>	
Alfalfa butterfly	<i>Colias eurytheme</i>	
California ringlet	<i>Coenonympha californica californica</i>	
Painted lady	<i>Vanessa cardui</i>	
Buckeye	<i>Precis coenia</i>	
Behr's metalmark	<i>Apodemia mormo virgulti</i>	
Western elfin	<i>Callophrys augustus iroides</i>	
Bramble or perplexing hairstreak	<i>Callophrys affinis perplexa</i>	
Pigmy blue	<i>Brephidium exilis</i>	
Marine blue	<i>Leptotes marina</i>	
Southern blue	<i>Glaucopsyche lygdamus australis</i>	
Funereal duskywing	<i>Erynnis funeralis</i>	
<u>Amphibians</u> (Nomenclature from Crother 2001 and Crother et al. 2003)		
Pacific treefrog	<i>Pseudacris regilla</i>	
American bullfrog+	<i>Rana catesbeiana</i>	
Western spadefoot	<i>Spea hammondi</i>	CSC
California toad	<i>Bufo boreas halophilus</i>	
<u>Reptiles</u> (Nomenclature from Crother 2001 and Crother et al. 2003)		
San Diego horned lizard	<i>Phrynosoma coronatum blainvillii</i>	CSC, *, MSCP
Western fence lizard	<i>Sceloporus occidentalis</i>	
Side-blotched lizard	<i>Uta stansburiana</i>	
Belding's orangethroat whiptail	<i>Aspidoscelis hyperythra beldingi</i>	CSC, MSCP
Coastal whiptail	<i>Aspidoscelis tigris multiscutatus</i>	
Two-striped garter snake	<i>Thamnophis hammondi</i>	*
Northern red diamond rattlesnake	<i>Crotalus ruber</i>	CSC
<u>Birds</u> (Nomenclature from American Ornithologists' Union 1998 and Unit 1984)		
Turkey vulture	<i>Cathartes aura</i>	
White-tailed kite	<i>Elanus leucurus</i>	CFP, *
Northern harrier	<i>Circus cyaneus hudsonius</i>	CSC, MSCP
Sharp-shinned hawk	<i>Accipiter striatus velox</i>	CSC
Cooper's hawk	<i>Accipiter cooperi</i>	CSC, MSCP
Red-shouldered hawk	<i>Buteo lineatus elegans</i>	
Red-tailed hawk	<i>Buteo jamaicensis</i>	
American kestrel	<i>Falco sparverius</i>	
California quail	<i>Callipepla californica californica</i>	
Band-tailed pigeon	<i>Columba fasciata monilis</i>	
Mourning dove	<i>Zenaida macroura marginella</i>	
Common ground dove	<i>Columbina passerina pallescens</i>	
Greater roadrunner	<i>Geococcyx californianus</i>	

APPENDIX 3g
WILDLIFE SPECIES OBSERVED/DETECTED ON THE DEL MAR MESA PRESERVE
(continued)

Common Name	Scientific Name	Status
Common barn owl	<i>Tyto alba pratincola</i>	
Western screech owl	<i>Megascops kennicottii</i>	
Lesser nighthawk	<i>Chordeiles acutipennis texensis</i>	
Poor-will	<i>Phalaenoptilus nuttallii</i>	
Anna's hummingbird	<i>Calypte anna</i>	
Allen's hummingbird	<i>Selasphorus sasin</i>	
Belted kingfisher	<i>Ceryle alcyon</i>	
Acorn woodpecker	<i>Melanerpes formicivorus bairdi</i>	
Nuttall's woodpecker	<i>Picoides nuttallii</i>	
Northern flicker	<i>Colaptes auratus</i>	
Black phoebe	<i>Sayornis nigricans semiatra</i>	
Say's phoebe	<i>Sayornis saya</i>	
Ash-throated flycatcher	<i>Myiarchus cinerascens cinerascens</i>	
Horned lark	<i>Eremophila alpestris</i>	
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	
Cliff swallow	<i>Hirundo pyrrhonota tachina</i>	
Western scrub-jay	<i>Aphelocoma californica</i>	
American crow	<i>Corvus brachyrhynchos hesperis</i>	
Common raven	<i>Corvus corax clarionensis</i>	
Hutton's vireo	<i>Vireo huttoni huttoni</i>	
Plain titmouse	<i>Parus inornatus transpositus</i>	
Bushtit	<i>Psaltriparus minimus minimus</i>	
Bewick's wren	<i>Thyromanes bewickii</i>	
House wren	<i>Troglodytes aedon parkmanii</i>	
Northern mockingbird	<i>Mimus polyglottos polyglottos</i>	
California thrasher	<i>Toxostoma redivivum redivivum</i>	
European starling+	<i>Sturnus vulgaris</i>	
Western bluebird	<i>Sialia mexicana occidentalis</i>	MSCP
Hermit thrush	<i>Catharus guttatus</i>	
Wrentit	<i>Chamaea fasciata henshawi</i>	
Blue-gray gnatcatcher	<i>Polioptila caerulea</i>	
Coastal California gnatcatcher	<i>Polioptila californica californica</i>	FT,CSC,MSCP
Phainopepla	<i>Phainopepla nitens lepida</i>	
American goldfinch	<i>Carduelis tristis salicamans</i>	
Lesser goldfinch	<i>Carduelis psaltria hesperophilus</i>	
House finch	<i>Carpodacus mexicanus frontalis</i>	
Orange-crowned warbler	<i>Vermivora celata</i>	
Yellow-rumped warbler	<i>Dendroica coronata</i>	
Common yellowthroat	<i>Geothlypis trichas</i>	
Lazuli bunting	<i>Passerina amoena</i>	
Spotted towhee	<i>Pipilo maculatus</i>	
California towhee	<i>Pipilo crissalis</i>	
Bell's sage sparrow	<i>Amphispiza belli belli</i>	CSC
Southern California rufous-crowned sparrow	<i>Aimophila ruficeps canescens</i>	CSC,MSCP
Song sparrow	<i>Melospiza melodia</i>	
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	
Golden-crowned sparrow	<i>Zonotrichia atricapilla</i>	

APPENDIX 3g
WILDLIFE SPECIES OBSERVED/DETECTED ON THE DEL MAR MESA PRESERVE
(continued)

Common Name	Scientific Name	Status
Western meadowlark	<i>Sturnella neglecta</i>	
Red-winged blackbird	<i>Agelaius phoeniceus</i>	
<u>Mammals</u> (Nomenclature from Jones et al. 1997)		
California ground squirrel	<i>Spermophilus beecheyi</i>	
Southern pocket gopher	<i>Thomomys umbrinus</i>	
Pacific (= agile) kangaroo rat	<i>Dipodomys agilis</i>	
Woodrat	<i>Neotoma</i> sp.	CSC
San Diego black-tailed jackrabbit	<i>Lepus californicus bennettii</i>	CSC
Cottontail rabbit	<i>Sylvilagus audubonii</i>	
Striped skunk	<i>Mephitis mephitis</i>	
Coyote	<i>Canis latrans</i>	
Gray fox	<i>Urocyon cinereoargenteus</i>	
Mountain lion	<i>Felis concolor</i>	CFP, MSCP
Bobcat	<i>Felis rufus</i>	
Southern mule deer	<i>Odocoileus hemionus fuliginata</i>	MSCP

+ = Introduced species

Status

CFP = California fully protected species

CSC = California Department of Fish and Game species of special concern

FE = Listed as endangered by the federal government

FT = Listed as threatened by the federal government

MSCP = Multiple Species Conservation Program covered species

* = Taxa listed with an asterisk fall into one or more of the following categories:

- Taxa considered endangered or rare under Section 15380(d) of CEQA guidelines
- Taxa that are biologically rare, very restricted in distribution, or declining throughout their range
- Population(s) in California that may be peripheral to the major portion of a taxon's range, but which are threatened with extirpation within California
- Taxa closely associated with a habitat that is declining in California at an alarming rate (e.g., wetlands, riparian, old growth forests, desert aquatic systems, native grasslands)

APPENDIX 3h
SENSITIVE PLANT SPECIES OBSERVED ON THE DEL MAR MESA PRESERVE

Species	State/Federal Status	CNPS List	CNPS Code	Typical Habitat/Comments
<i>Adolphia californica</i> California adolphia	-/-	2	1-2-1	Chaparral
<i>Arctostaphylos glandulosa</i> ssp. <i>crassifolia</i> Del Mar manzanita	-/FE	1B	3-3-2	Coastal chaparral
<i>Artemisia palmeri</i> San Diego sagewort	-/-	2	2-2-1	Coastal sage scrub, chaparral, riparian
<i>Brodiaea orcuttii</i> Orcutt's brodiaea	-/-	1B	1-3-2	Closed-cone coniferous forest, meadows, cismontane wood-land, valley and foothill grass-land, vernal pools
<i>Ceanothus verrucosus</i> Wart-stemmed ceanothus	-/-	2	1-2-1	Chaparral
<i>Comarostaphylis diversifolia</i> ssp. <i>diversifolia</i> Summer holly	-/-	1B	2-2-2	Chaparral
<i>Dichondra occidentalis</i> Western dichondra	-/-	4	1-2-1	Chaparral, cismontane wood-land, coastal sage scrub, valley and foothill grassland
<i>Eryngium aristulatum</i> var. <i>parishii</i> San Diego button celery	CE/FE	1B	2-3-2	Vernal pools, marshes
<i>Ferocactus viridescens</i> Coast barrel cactus	-/-	2	1-3-1	Chaparral, coastal sage scrub, valley and foothill grassland
<i>Harpagonella palmeri</i> var. <i>palmeri</i> Palmer's grappling hook	-/-	2	1-2-1	Chaparral, coastal sage scrub, valley and foothill grassland
<i>Lessingia filaginifolia</i> var. <i>filaginifolia</i> (= <i>Corethrogyne filaginifolia</i> var. <i>linifolia</i>) Del Mar Mesa sand aster	-/-	1B	3-2-3	Chaparral, coastal sage scrub
<i>Monardella linoides</i> ssp. <i>viminea</i> Willow monardella	CE/FE	1B	2-3-2	Riparian scrub
<i>Muilla clevelandii</i> San Diego goldenstar	-/-	1B	2-2-2	Chaparral, coastal sage scrub, valley and foothill grassland, vernal pools
<i>Myosurus minimus</i> ssp. <i>apus</i> Little mousetail	-/-	3	2-3-2	Vernal pools
<i>Ophioglossum californicum</i> (= <i>Ophioglossum lusitanicum</i> ssp. <i>californicum</i>) California adder's-tongue fern	-/-	4	1-2-2	Clay mesa soils

APPENDIX 3h
SENSITIVE PLANT SPECIES OBSERVED ON THE DEL MAR MESA PRESERVE
(continued)

Species	State/Federal Status	CNPS List	CNPS Code	Typical Habitat/Comments
<i>Pogogyne abramsii</i> San Diego mesa mint	CE/FE	1B	2-3-3	Vernal pools
<i>Quercus dumosa</i> Nuttall's scrub oak	--	1B	2-3-2	Coastal chaparral
<i>Selaginella cinerascens</i> Ashy spike-moss	--	4	1-2-1	Chaparral, coastal sage scrub

NOTE: See Appendix 3c for Sensitivity Codes

APPENDIX 3i
Descriptions of Sensitive Species Occurring
on the Del Mar Mesa Preserve and Not Covered by the MSCP

California adolphia (*Adolphia californica*). California adolphia is a CNPS List 2 species in the buckthorn family (Rhamnaceae). This species generally occurs in Diegan



Photograph A3i-1. California Adolphia (pale green shrub in the middle of the picture) in the Northeast Portion of the Del Mar Mesa Preserve

coastal sage scrub or near the edge of chaparral, in dry locales with shrubs four to five feet tall. This shrub flowers from December to April and loses its leaves in late summer and fall, making it difficult to find. Its spiny stems are identifiable at close range year-round, however. It is associated with San Miguel and Friant soils (Reiser 2001). Its geographic range extends from San Diego County south into Baja California. In San Diego County, it is found from the Carlsbad area south into the Proctor Valley and Otay region (Beauchamp 1986).

On the Del Mar Mesa Preserve, California adolphia is a component of the coastal sage scrub and has been found in the northeast portion of the Preserve and likely occurs at other locations as well.

San Diego sagewort (*Artemisia palmeri*). San Diego sagewort is a member of the plant family Asteraceae. This perennial is on List 2 of the CNPS *Inventory* (CNPS 2001). It generally occurs in coastal sage scrub and along drainages in San Diego County and northern Baja California, Mexico. In San Diego County, its distribution ranges from La Jolla south to Otay and east to Alpine (Beauchamp 1986). This species can occur in low numbers in dense riparian vegetation and its presence may be very difficult to detect.

Summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*). Summer holly is a CNPS List 1B species. This evergreen shrub in the heath family (Ericaceae) reaches heights of 15 feet and produces a small white flower from April to June (Munz 1974). Summer holly is found in the chaparral in Orange, Riverside and San Diego Counties, as well as Baja California, Mexico. In San Diego County it generally occurs at low elevations in chaparral communities near the coast. Summer holly is threatened by development and gravel mining (CNPS 2001).

Western dichondra (*Dichondra occidentalis*). Western dichondra is a CNPS List 4 species, indicating that it has limited distribution or is infrequent throughout its range. Its



Photograph A3i-2. Western Dichondra

range extends from Ventura County south into Baja California, Mexico, including the Channel Islands. In San Diego County, it is known from Agua Hedionda south to Point Loma and inland to Poway, Otay Mountain, and the Tijuana Hills (Beauchamp 1986). This small perennial herb in the morning-glory family (Convolvulaceae) flowers from March to May. It often grows almost completely hidden under shrubs or trees in coastal sage scrub and chaparral, or among rocky outcrops

in grasslands. It grows primarily in dry sandy soils including Heuerhuero soils and Hambright gravelly clay loam (Reiser 2001). The numbers of western dichondra are slowly declining in southern California because habitat is being lost to development and weeds are invading native vegetation communities.

Palmer's grappling hook (*Harpagonella palmeri*). Palmer's grappling hook is a member of the Boraginaceae family. This annual is a CNPS *Inventory* (CNPS 2001) List 2 species that occurs in Los Angeles, Orange, Riverside, and San Diego Counties as well as in Arizona; in Baja California, Mexico; and on San Clemente Island (Munz 1974). In San Diego County, it occurs on clay soils from Guajome Mesa, Rancho Santa Fe, Poway, Kearny Mesa, Mission Gorge, Rice Canyon, and Otay (Beauchamp 1986).

Little mousetail (*Myosurus minimus* ssp. *apus*). This annual is on List 3 of the CNPS *Inventory*, indicating that additional study is needed to determine the level of threat to the species (CNPS 2001). It is an annual herb in the buttercup family (Ranunculaceae) that flowers from March to June. Little mousetail is endemic to vernal pools, where it typically grows in the deeper portions of vernal pools. It ranges from southern Oregon to northern Baja California, Mexico, and can be found in the Central Valley and Riverside, San Bernardino, and San Diego Counties in California. In San Diego County, it is found in a limited number of vernal pools on Del Mar Mesa, Camp Pendleton, Otay Mesa, near Otay Lake, near Peñasquitos Canyon, and in the Ramona area (Reiser 2001).

California adder's-tongue fern (*Ophioglossum californicum*). California adder's-tongue fern is a CNPS List 4 whose range extends from the Sierra Nevada foothills to southern California and southward into Baja California, Mexico. In San Diego County, the fern has been reported from Kearny Mesa, Olivenhain, Proctor Valley, and Escondido (Beauchamp 1986). This perennial rhizomatous herb typically occurs on grassy slopes and near vernal pools and seeps, in coastal and foothill locations below 900 feet elevation. The California adder's-tongue fern is easily observed during the

springtime, but becomes inconspicuous later in the season. This species is associated with vernal pools and other seasonal wetlands and wet meadows on the Preserve. It has been documented as occurring on Del Mar Mesa Preserve, but its location has not been mapped.

Nuttall's scrub oak (*Quercus dumosa*). Nuttall's scrub oak is a member of the Fagaceae family. This evergreen shrub is a CNPS *Inventory* (CNPS 2001) List 1B species that occurs in Santa Barbara, Orange, and San Diego Counties as well as in Baja California, Mexico. Nuttall's scrub oak is found within chaparral and coastal sage scrub vegetation on sandy or clay loam soils. This species occurs abundantly within southern maritime chaparral on the Preserve.

Ashy spike-moss (*Selaginella cinerascens*). Ashy spike-moss is no longer considered a List 4 species by CNPS (CNPS 2001); however, due to the importance of this species to habitat and ecosystem stability, we still consider this species a sensitive resource. Ashy spike-moss is a prostrate non-flowering perennial herb in the spike-moss family (Selaginellaceae) that reproduces by spores in March. It occurs in undisturbed coastal sage scrub and chaparral from Orange County south into Baja California, Mexico. In San Diego County ashy spike-moss is most often found near the coast, south of Highway 78, particularly around the periphery of the city of San Diego. Ashy spike-moss has been documented as occurring on Del Mar Mesa Preserve (see Appendix 3e) and is present in many of the vegetation communities, particularly on flat mesas or slightly sloped mesa edges, wherever the cryptogamic/microbiotic crust has not been disturbed and also in some locations that are recovering from disturbance.

Two-striped garter snake (*Thamnophis hammondi*). The two-striped garter snake is a sensitive species that may grow as long as 36 inches though 18 to 24 inches is more usual. Its dorsal scales are keeled, which breaks up the reflection of light and results in a dull luster. The overall color is olive drab with a single yellowish stripe running down each side of the body. Patterned into the dorsal coloration are four rows of small, dark spots. The belly is dull yellow, or sometimes salmon colored. The two-striped garter snake ranges in coastal California from the vicinity of Salinas south to El Rosario in Baja California, Mexico. They are normally found in or near permanent fresh water, inhabiting streams, ponds, and lakes throughout their range. They are often found even in temporary bodies of water such as vernal pools. It is the most common snake in southern California, and it is not unusual to encounter several individuals at a time. Activity is most common around dusk and in the early evening. Adults feed on frogs, tadpoles, toads, insect larvae, fish, fish eggs, and earthworms. The two-striped garter snake is ovoviviparous. Breeding commences in April and May and continues throughout the summer months. Gestation is approximately nine weeks. As many as 25 young may be born, though 12 to 13 is more common.

Northern red diamond rattlesnake (*Crotalus ruber*). The northern red diamond rattlesnake is a CDFG species of special concern. This species occurs below 1,200



Photograph 3i-3.
Red Diamond Rattlesnake at Carmel
Mountain

meters (4,000 feet) on both sides of the Peninsular Ranges of southwestern California in coastal sage scrub, desert scrub, open chaparral, woodland, and grassland habitats, as well as agricultural fields (Stebbins 1985). This snake is commonly found in areas with rock outcrops. Population declines in the red diamond rattlesnake are generally attributable to impacts related to the increased development near habitat in which this snake is found.

Sharp-shinned hawk (*Accipiter striatus*) The sharp-shinned hawk is a California species of special concern that inhabits woodlands, parks, and residential areas throughout most of North America, feeding mostly on birds and occasionally on small mammals, reptiles, and other small prey (Ehrlich et al. 1988). When breeding in mountainous coniferous/deciduous forests in April through August, the sharp-shinned hawk usually nests within 90 meters of water (Zeiner et al. 1990). It is a common migrant and rare summer resident in San Diego County (Unitt 1984).

White-tailed kite (*Elanus leucurus*). The white-tailed kite is a California fully protected species that occurs in coastal lowland areas from Oregon to northern Baja California, Mexico (National Geographic Society 1983). This resident bird nests in riparian woodlands, live oaks, or sycamore groves which border grassland or open fields (Unitt 1984 and 2004). The white-tailed kite forages over open areas and grasslands feeding primarily on small rodents, in particular the California vole or meadow mouse (Unitt 2004), and insects (National Geographic Society 1983). This species is known to roost in large communal groups (Unitt 1984 and 2004). White-tailed kite populations in southern California have declined due to the loss of grassland foraging habitat to urbanization. This species was observed on the Preserve.

Blue-gray gnatcatcher (*Poliophtila caerulea*). The blue-gray gnatcatcher is on the sensitive species list for the City of San Diego. The blue-gray gnatcatcher is distributed throughout Mexico and the U.S., excluding northern plains states and the northwest. Locally, this species is a fairly common migrant and winter visitor and a rare and localized summer resident. The blue-gray gnatcatcher winters in dense riparian undergrowth, weedy/brushy agricultural areas, thickets in desert washes, and occasionally chaparral. It breeds in foothill chaparral, desert-edge scrub, and mesquite thickets. Brood-parasitism by brown-headed cowbirds is one contributing reason to the decline of this species.

Bell's sage sparrow (*Amphispiza belli belli*). Bell's sage sparrow is a CDFG species of special concern. Bell's sage sparrow is an uncommon to locally fairly common resident along the extreme west coast of California. Its breeding range is along the coastal slopes from Trinity County south into northwestern Baja California, Mexico. Locally, it can be found in the interior chaparral and coastal sage scrub habitats, especially dense stands of chamise chaparral (Small 1994). This race is essentially sedentary. Male Bell's sage sparrows show high breeding territory tenacity, even when the habitat is altered dramatically (Ehrlich et al. 1988). This species feeds primarily on spiders, insects, and seeds while breeding, and seeds during the winter.

San Diego black-tailed jackrabbit (*Lepus californicus bennettii*). The San Diego black-tailed jackrabbit is a CDFG species of special concern. This species can be found throughout southern California, with the exception of the high-altitude mountains. The black-tailed jackrabbit is strictly herbivorous, preferring habitat with ample forage such as grasses and forbs. The San Diego black-tailed jackrabbit breeds throughout the year with the greatest number of births occurring from April through May. This species is generally solitary, except when mating and raising young (Zeiner et al. 1990).

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APPENDIX 3j
SENSITIVE WILDLIFE SPECIES OCCURRING ON THE DEL MAR MESA PRESERVE

Species	Status	Habitat
<u>Invertebrates</u> (Nomenclature from Eriksen and Belk 1999)		
San Diego fairy shrimp <i>Branchinecta sandiegonensis</i>	FE, MSCP, *	Vernal pools.
<u>Amphibians</u> (Nomenclature from Crother 2001 and Crother et al. 2003)		
Western spadefoot <i>Spea hammondi</i>	CSC	Vernal pools, floodplains, and alkali flats within areas of open vegetation.
<u>Reptiles</u> (Nomenclature from Crother 2001 and Crother et al. 2003)		
San Diego horned lizard <i>Phrynosoma coronatum blainvillii</i>	CSC, MSCP, *	Chaparral, coastal sage scrub with fine, loose soil. Partially dependent on harvester ants for forage.
Belding's orangethroat whiptail <i>Aspidoscelis hyperythra beldingi</i>	CSC, MSCP,	Chaparral, coastal sage scrub with coarse sandy soils and scattered brush.
Two-striped garter snake <i>Thamnophis hammondi</i>	CSC, *	Permanent freshwater streams with rocky bottoms. Mesic areas.
Northern red diamond rattlesnake <i>Crotalus ruber</i>	CSC	Desert scrub and riparian, coastal sage scrub, open chaparral, grassland, and agricultural fields.
<u>Birds</u> (Nomenclature from American Ornithologists' Union)		
Turkey vulture <i>Cathartes aura</i>		Open fields, grasslands, rocky cliffs. Spring and fall migrant, winter visitor, rare summer resident..
White-tailed kite (nesting) <i>Elanus leucurus</i>	CFP, *	Nest in riparian woodland, oaks, sycamores. Forage in open, grassy areas. Year-round resident.
Northern harrier (nesting) <i>Circus cyaneus</i>	CSC, MSCP	Coastal lowland, marshes, grassland, agricultural fields. Migrant and winter resident, rare summer resident.
Sharp-shinned hawk (nesting) <i>Accipiter striatus</i>	CSC	Open deciduous woodlands, forests, edges, parks, residential areas. Migrant and winter visitor.
Cooper's hawk (nesting) <i>Accipiter cooperi</i>	CSC, MSCP	Mature forest, open woodlands, wood edges, river groves. Parks and residential areas. Migrant and winter visitor.
California horned lark <i>Eremophila alpestris actia</i>	CSC	Sandy shores, mesas, disturbed areas, grasslands, agricultural lands, sparse creosote bush scrub.

APPENDIX 3j
SENSITIVE WILDLIFE SPECIES OCCURRING ON THE DEL MAR MESA PRESERVE
(continued)

Species	Status	Habitat
Coastal California gnatcatcher <i>Polioptila californica californica</i>	FT, CSC, MSCP	Coastal sage scrub, maritime succulent scrub. Resident.
Southern California rufous-crowned sparrow <i>Aimophila ruficeps canescens</i>	CSC, MSCP	Coastal sage scrub, chaparral, grassland. Resident.
Bell's sage sparrow <i>Amphispiza belli belli</i>	CSC	Chaparral, coastal sage scrub. Localized resident.
Western bluebird <i>Sialia mexicana</i>	MSCP	Open woodlands, farmlands, orchards.
<u>Mammals</u> (Nomenclature from Jones et al. 1997)		
San Diego black-tailed jackrabbit <i>Lepus californicus bennettii</i>	CSC	Open areas of scrub, grasslands, agricultural fields.
Mountain lion <i>Felis concolor</i>	CFP, MSCP	Many habitats.
Southern mule deer <i>Odocoileus hemionus fuliginata</i>	MSCP	Many habitats.

STATUS CODES

Listed/Proposed

FE = Listed as endangered by the federal government
 FT = Listed as threatened by the federal government

Other

CFP = California fully protected species
 CSC = California Department of Fish and Game species of special concern
 MSCP = Multiple Species Conservation Program covered species
 * = Taxa listed with an asterisk fall into one or more of the following categories:

- Taxa considered endangered or rare under Section 15380(d) of CEQA guidelines
- Taxa that are biologically rare, very restricted in distribution, or declining throughout their range
- Population(s) in California that may be peripheral to the major portion of a taxon's range, but which are threatened with extirpation within California
- Taxa closely associated with a habitat that is declining in California at an alarming rate (e.g., wetlands, riparian, old growth forests, desert aquatic systems, native grasslands)

Short-leaved Dudleya Enhancement and Restoration Plan for the Carmel Mountain Preserve, San Diego, California

Prepared by

Mark Dodero, Biologist

Bobbie Stephenson, Biologist

April 2005

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1.0 Introduction

1.1 Existing Locations of Short-leaved Dudleya

The five remaining natural populations of short-leaved dudleya (*Dudleya blochmaniae* ssp. *brevifolia*) are found on sandstone mesas of the Del Mar and La Jolla region of San Diego County. Carmel Mountain and the main portion of Torrey Pines State Park nearby, support the largest populations of short-leaved dudleya. Smaller populations are found at Crest Canyon in Del Mar Heights; Skeleton Canyon at the University of California, San Diego (UCSD); and the Torrey Pines State Park extension north of Peñasquitos Lagoon. The short-leaved dudleya populations are in southern maritime chaparral within the fog belt of coastal San Diego County.

1.2 Purpose, Goals, and Objectives

The purpose of this Plan is to establish management procedures to ensure that the subpopulations of the short-leaved dudleya, a species that is extremely restricted in range, is not extirpated on Carmel Mountain. To this end, the following goals have been established for the Carmel Mountain Preserve:

Goal: Protect and preserve the existing subpopulations of short-leaved dudleya.

Objective: Eliminate disturbance within the existing short-leaved dudleya populations to minimize weed invasions and damage to the dudleya from trampling and vehicles.

Goal: Expand the existing populations of short-leaved dudleya.

Objective: To maintain and enhance the genetic diversity of the dudleya populations to make them more resistant to stochastic changes

Goal: Establish new populations with a minimum of 10,000 short-leaved dudleya.

Objective: To reduce the risk of population losses due to catastrophic events such as fire and resulting weed invasions.

2.0 Management Actions

The goals and objectives will be successfully attained by implementing the management actions.

Goal: Protect and preserve the existing subpopulations of short-leaved dudleya.

Objective: Eliminate disturbance within the existing short-leaved dudleya populations.

Action A: Reroute trails and roads to avoid the subpopulations and to protect the subpopulations from trampling by humans, bicycles and other vehicles, and horses.

Action B: Allow the subpopulations to fill in open spots within the perimeter of the existing populations and to expand outward into newly protected areas for three years before beginning active restoration procedures. Monitor the subpopulations each spring.

Action C: Monitor the subpopulations once yearly for three years.

Close roads bisecting existing habitat by implementation of the proposed trail and road closure program included in this document and through future cooperative agreements with SDG&E and private inholding landowners.

Action C: Restore disturbed habitat inside the perimeter of each of the three subpopulations.

Goal: Expand the existing self-sustaining populations of short-leaved dudleya.

Objective: Restore habitat adjoining the subpopulations.

Action A: Choose an adjoining area with the same physical characteristics as those of the existing subpopulations.

Action B: Remove weedy species by hand or using hand tools.

Preserve, protect, restore, and enhance sandstone terraces dominated by ashy spike-moss and other microbotic species as habitat for new populations of short-leaved dudleya.

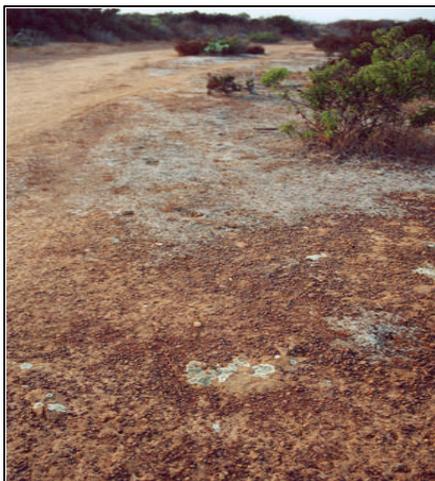
- Reroute foot, bike, and horse trails around existing subpopulations of short-leaved dudleya and potential population expansion areas.
- Enter into an MOU between the City of San Diego and CDFG to allow for collection of 5 percent or less of the seed crop from the Carmel Mountain population annually for a period of approximately 10 years.
- Germinate seed to produce plants for captive seed production.
- Use propagated seed to directly seed appropriate restoration and enhancement sites.
- Propagate short-leaved dudleya from seed to grow mature plants for translocation into existing and new population sites.
- Repair of tire ruts with hand tools in areas where repair activities will not adversely affect existing sensitive species or microbotic crusts.

- Implement an exotic plant control measure in short-leaved dudleya habitat. Control measures can include hand removal using cutting devices that minimize soil disturbance, the use of leaf blowers/vacuums to remove weed seeds from microbiotic crust/dudleya habitat areas and limited herbicide spraying where sensitive resources including the short-leaved dudleya will not be impacted. Replanting/reseeding with site appropriate natives grown from locally collected seed.
- Collect, propagate, and broadcast appropriate species of native seed into restoration sites where weeds are under control.

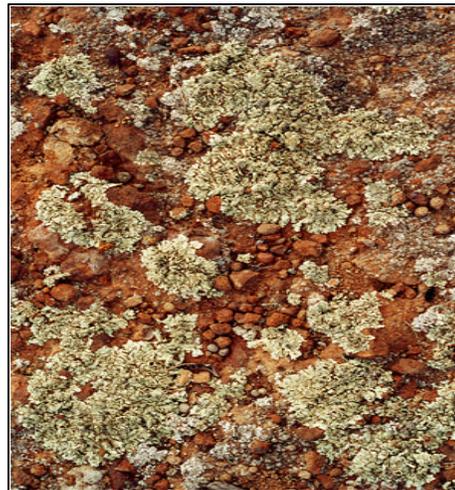
3.0 Short-leaved Dudleya Biology

3.1 Habitat

Typically, the short-leaved dudleya occupies openings that are dominated by microbiotic crust, a combination of species such as lichens, mosses, and ashy spike-moss, within the southern maritime chaparral. Herbaceous plants such as Cleveland's shooting stars (*Dodecatheon clevelandii*), dot-seed plantain (*Plantago erecta*), pygmy weed (*Crassula connata*), skunkweed (*Navarettia hamata*), spineflower (*Chorizanthe* sp.), herba impia (*Filago* sp.), popcorn flower (*Plagiobothrys* sp.), and everlasting nest straw (*Stylocline gnaphaliodes*) are also common associates in the openings.



Photograph A5-1. Short-leaved Dudleya Habitat (Subpopulation 3), showing ashy spikemoss and lichens



Photograph A5-2. Short-leaved Dudleya Habitat (close-up), with manganese nodules and lichens, on the Edge of the Mesa at Carmel Mountain

The southern maritime chaparral that surrounds the short-leaved dudleya populations on Carmel Mountain is about eight feet tall and includes chamise (*Adenostoma fasciculatum*), mission mazanita (*Xylococcus bicolor*), black sage (*Salvia mellifera*), wart-stemmed ceanothus (*Ceanothus verrucosus*), and an occasional Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*).

3.2 Phenology

Like other members of the subgenus *Hasseanthus*, short-leaved dudleya is drought-deciduous in summer, surviving on starch reserves stored in a subterranean tuberous caudex (stem). Short-leaved dudleya typically grows on shallow sandy soils that overlay a cemented sandstone hardpan. These soils where the dudleya grows are frequently so shallow that the underground stem will grow downward for a centimeter, hit the hard pan, and continue growing horizontally along the surface of the hardpan layer (Dodero pers. obs.). In the thin soil areas the stem of the short-leaved dudleya can be very irregular in shape.

Annual growth is initiated after the first significant autumn rains and the plants grow actively through early April, as long as soil conditions are moist. After growth is initiated, dry periods of several weeks in mid-winter can cause the plants to cease growing and become dormant for the rest of season (Dodero 1995). In some cases, even if additional rains fall later in the winter or spring, the plants will not respond. This drought dormancy effect seems to be most common in smaller plants, whereas larger plants will usually maintain their leaves unless drought conditions are prolonged by higher than normal temperatures and low humidity. This dormancy response can lead to the mistaken determination that the plants have died or did not occupy a particular location, even though they are actually present underground.

Short-leaved dudleya can begin flowering as early as late April and continue flowering through early June, with seeds being set in late June and July. Short-leaved dudleya generally flowers later in the season than populations of the closely related Blochman's dudleya (*Dudleya blochmaniae* ssp. *blochmaniae*) elsewhere in San Diego County (Moran 1951). Populations of short-leaved dudleya on Carmel Mountain also begin to flower somewhat earlier than non-specific populations at Torrey Pines State Park, where longer lasting fog cover causes more mesic conditions (Dodero pers. obs.).

The percentage of flowering individuals in a season is correlated with the amount and frequency of rainfall during the winter and early spring. Well-spaced rains throughout the winter, at one- to two-week intervals, leads to a greater number of flowering plants than in dry years or when long dry periods occur in the middle of the normal rainy season. Small plants typically do not flower in a dry year, but in a year with above average or well-spaced rains, the same plant is capable of successful reproduction (Dodero 1995).

In any given year only 10 to 30 percent of the individuals in a population will flower. Population estimates made from flowering individuals alone significantly underestimate the total number of plants in a population. Reproduction is primarily by seed; however, short-leaved dudleya is also capable of vegetative reproduction via detached leaves both in nature and in cultivation (Doderer 1995). Within one to three weeks after leaves are removed from the plant, they develop roots at the petiole base and are ready for planting.

Census numbers generated through the San Diego Multiple Species Conservation Program (MSCP) monitoring program for the three subpopulations of short-leaved dudleya on Carmel Mountain show an increase in the number of flowering individuals in 2001 from the two previous years (City of San Diego 2001). Monitoring has resulted in the following population data for Carmel Mountain:

<u>Year</u>	<u>Rainfall</u>	<u>Number of Individuals</u>
1999	6.5	27,317
2000	5.7	23,487
2001	8.6	66,637
2002	3.0	1,446
2003	10.4	113,134
2004	4.2	18,907
2005	22.49	123,200

These numbers likely reflect responses of the populations to the timing and amount of rainfall each of those years and probably do not indicate an actual increase in population numbers in light of the continued disturbance and ongoing spreading of weeds. In 1999 and 2000 rainfall was well below average and long dry periods of up to several weeks occurred in midwinter. As described above, this type of weather pattern is not favorable for most short-leaved dudleya plants to flower. Even though rainfall was still below normal in the 2001 season, the rains that did occur were well spaced and effective for sustaining plant growth, which is probably the reason more plants flowered than in previous years. The 2003 rainfall season total of 10.4 inches was near the annual average rainfall and this is reflected in the increase in plant numbers observed in 2002, the driest year on record.

Potential pollinators that have been seen visiting short-leaved dudleya flowers include bee flies (Bombyliidae), hover flies (Syrphidae), soft-winged flower beetles (*Dasytes* sp.; family Melyridae), honey bees (*Apis mellifera*), bumble bees (genus *Bombus*), and digger bees (family Anthophoridae). The ovoid, striated seeds, at approximately 0.8 millimeter long, are very small and are generally dispersed by wind and water. They have no appendages for attaching to other material or animals for dispersal. Seedlings are frequently seen aggregated where water collects during sheet-flooding across the sandy surface of the mesa. Also, dried inflorescences of this species have been

observed blowing across the sand on windy days after they have become detached from the parent plant. This presumably disperses seed as well (Dodero 1995).

4.0 Current Conditions of Subpopulations on Carmel Mountain

All three subpopulations at Carmel Mountain have suffered from past and ongoing disturbances such as road grading, off-road vehicle use, horseback riding, bicycling, and foot traffic.



Photograph A5-3. Road Bisecting the Short-Leaved Dudleya Habitat



Photograph A5-4. Horse Hoof Imprint in Microbiotic Crust



Photograph A5-5. Bicycle Tire Tracks and damaged Microbiotic Crust



Photograph A5-6. Tire Ruts and Damaged Microbiotic Crust at the Short-Leaved Dudleya Subpopulation 1



Photograph A5-7. Weed Invasion into Short-leaved Dudleya Habitat after Disturbance from Pocket Gophers

Damage to the dudleya areas has been particularly severe when vehicles have been driven through the habitat during rainy periods when wet soils and microbiotic crusts are most easily damaged.

Although access is more restricted since developments have been built adjacent to the preserve, vehicles, bicycles, horses, and foot traffic continue to crush short-leaved dudleya plants on Carmel Mountain. In addition, these disturbances are breaking and crushing the surrounding microbiotic crust, which allows and promotes weed invasion.

After the initial disturbance, pocket gophers frequently move into the disturbed area to feed on non-native plants, and their burrowing further churns the soil and promotes additional weed growth. The gopher disturbance results in further weed invasion as more non-native annuals invade the disturbed soils (RECON 1999). Access by illegal off-road vehicles is still possible from the SDG&E access road.

5.0 Habitat and Population Management of Existing Populations

5.1 Site Protection

The first priority for the three areas is to protect them from further disturbance from vehicle, horse, and foot traffic as outlined in the trail and road closure program. A locked gate should be installed at the southern terminus of the SDG&E access road to prevent continued unauthorized vehicle traffic into the Preserve. The roads/trails that bisect subpopulations two and three on Carmel Mountain are proposed for closure or rerouting of the trails around the short-leaved dudleya habitat. The SDG&E access road that runs immediately adjacent to Subpopulation 1 is not proposed for closure at this time. This road should be considered for closure if alternate access to SDG&E transmission towers and the private inholdings can be arranged through negotiations between the City, the landowners, and SDG&E. Barriers such as split-rail fencing could be installed along the edge of the road/trail to protect Subpopulation 1. The existing roads/trails that go through

Subpopulations 2 and 3 are proposed for closure and fencing barriers and signage can be placed at appropriate locations to discourage foot and vehicle traffic.

If protective fences or barriers are installed, the location and design of the fences should be carefully considered so that the fence installation and maintenance activities do not impact the dudleya populations or the microbotic crusts in the vicinity. The short-leaved dudleya populations on Carmel Mountain are being censused annually as part of MSCP rare plant monitoring program conducted by the City of San Diego (City of San Diego 2001).

5.2 Maintenance

Hand irrigation for new seedlings and transplants will likely be needed the first season. If dry periods longer than approximately two weeks occur (or if plants look desiccated) after seedlings have germinated or flats of seedlings have been planted, supplemental water will be needed to ensure the greatest survivorship of individuals. Watering of seedlings and transplants should be done gently to minimize any soil disturbance that can uproot seedlings or expose the stem of the plants to the air. The plants should be kept moist until natural rainfall occurs. If natural rain events occur at regular intervals less supplemental watering will be required.

5.3 Monitoring

As mentioned previously, the short-leaved dudleya are part of an ongoing MSCP monitoring program. The goals of the annual monitoring program are to: (1) document ecological trends, (2) evaluate the effectiveness of management activities, (3) provide new data on species populations, and (4) evaluate the indirect impacts of land uses and construction. The following are additional monitoring recommendations for the restoration and enhancement program for short-leaved dudleya on Carmel Mountain intended to meet these stated goals.

With careful monitoring, researchers can detect changes in managed and unmanaged populations and communities over time (Primack 1996; Sutter 1996). Monitoring can be used to obtain basic biological information regarding life history traits of species including seed production, pollination, herbivory, dispersal, and seed and plant dormancy (Sutter 1996). With these goals in mind, the restored and newly created populations will be monitored for a minimum of five years. Monitoring activities will include:

- Photographing plots from permanent locations during the active growing period of short-leaved dudleya (February);

- Collection of quantitative data on total counts of short-leaved dudleya individuals in early February (MSCP Biological Monitoring Plan);
- Collection and identification of insect pollinators from the existing population of short-leaved dudleya at Carmel Mountain and the new population sites in May and June to assess on-site pollinator diversity and to ensure sufficient preservation of open ground habitat for pollinators;
- Collection of quantitative data on total counts of flowering individuals at the new population sites in May and June; and
- Collection of detailed qualitative and quantitative information regarding the success of exotic species eradication efforts at the restoration/translocation sites each year in spring. The extent of exotic and native species will be quantified using global positioning system (GPS) technology and the resulting changes in the distribution of these plants, including the dudleya, which will be monitored throughout the five-year monitoring period.

In addition, seedlings established at new population sites will be monitored for collection of detailed data on dudleya growth rates. A minimum of 40 seedlings will be marked and followed through their development from germination through five consecutive growing seasons. Data to be recorded includes number of rosette leaves, maximum length of rosette leaf, number and height of inflorescences, and presence of seed. Leaf measurement data will be recorded annually during late February–early March when the plants have reached their maximum leaf size for the season. The number and height of the inflorescences will be recorded annually in late April–early May during the flowering period.

Based on growth data recorded for variegated dudleya and Blochman's dudleya, short-leaved dudleya seedling plants germinated in the field are not expected to reach flowering maturity under natural conditions until at least the third season of growth (Doderer 1995).

All monitoring activities should be conducted with care to minimize impacts to short-leaved dudleya and microbotic crusts caused by foot traffic. Even occasional foot traffic can have negative effects on habitat quality when microbotic crusts are broken and weeds invade a site as a result of disturbance. Land managers should evaluate the effects of monitoring on habitat quality and adjust the monitoring program schedule and tasks accordingly if damage is occurring.

6.0 Population and Habitat Enhancement and Restoration

6.1 Procedures for Enhancement and Restoration

6.1.1 Site Selection

There are a number of characteristics to consider when selecting a translocation site. Fiedler and Laven (1996) suggest these selection criteria fall into four general categories: physical, biological, logistical, and historical. Physical characteristics for site selection can be straightforward and typically focus on soils and landscape characteristics. Biological criteria are considered to be the ecological characteristics of a species. Translocation sites should be selected based on the presence of appropriate habitat parameters, including similar plant community structure and successional stage. In addition, potential competitors of the plant species being translocated, including weeds, should be identified and a plan developed and implemented for the control of these other species. Logistical criteria to consider when choosing the translocation site should include how well the site can be protected from unauthorized human access, as well as the level of difficulty in accessing the site for monitoring and remediation efforts. Historical selection criteria include two issues: (1) the use of currently occupied versus potential habitat and (2) consideration of a species evolutionary history, including its specific habitat requirements. Knowledge of how the habitat, occupied by the species, changes over time and how new habitat arises and becomes occupied by the plant is important to the success of restoration efforts. The site selection criteria outlined by Fiedler and Laven (1996) are reflected in the choice of the proposed population creation sites depicted in Figures A5-1a and A5-1b.

Guerrant (1996) performed modeling experiments on a number of rare plant species for which reintroduction programs were implemented. He found the risk of population extinction is greatly reduced if plants of even slightly larger than seedling size are used in a translocation program. Guerrant also found that the size of the created populations after 10 years is strongly correlated with the size of the plants used. The use of the largest individuals of a species resulted in the largest population size. These size factors have been taken into account in designing the methods for propagating and establishing a new population of small-leaved dudleya at Carmel Mountain.

In addition, Guerrant (1996) points out that one of the most serious problems associated with reintroduction is a loss of genetic diversity. Research has shown that reduced population size can rapidly result in the loss of genetic variability. One way to avoid the loss of genetic diversity is to rapidly expand the size of the newly established population

Figure A5-1a; COLOR-OVERSIZE

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Figure A5-1b; COLOR-OVERSIZE

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(Guerrant 1996). By increasing the number of individuals soon after the population is established, much of the genetic variability present in a population can be maintained.

The natural populations of short-leaved dudleya are found on hard sandstone terraces, a mixture of sandstones and clay with iron concretions that have formed by weathering of the rock. The dominant plants in dudleya habitat include ashy spike-moss and herbaceous species. The proposed creation sites have similar soils and plant communities to those found at the natural population sites nearby.

Dodero (1995) notes that the range of this and other closely related species have probably expanded and contracted throughout the evolutionary history of the group, as areas of appropriate habitat have been exposed and subsequently eroded. The mosaic of occupied and potential dudleya habitat changes over time and probably causes populations to come into contact or become isolated as habitat areas shrink and then expand. Limited dispersal capabilities of short-leaved dudleya reduces the chances that suitable habitat nearby will be colonized naturally.

Three sites, corresponding to the subpopulations identified in the City of San Diego MSCP monitoring program report (City of San Diego 2001) and chosen to expand the subpopulations, have been selected as enhancement areas for short-leaved dudleya (see Figures A5-1a and A5-1b). All conditions at the sites are favorable for growing short-leaved dudleya.

6.1.2 Site Preparation

Because short-leaved dudleya will be established in existing, albeit somewhat disturbed, habitat on intact soils, no soil testing will be necessary. The intact sites most likely support the mycorrhizal associations important to the successful establishment of native plant species. No native species are anticipated to be displaced by this restoration project, which is designed to enhance native habitat for the small-leaved dudleya.

The sites have non-native weedy species, particularly annual grasses, that must be removed before the short-leaved dudleya and its associate plant species are planted. Weeds will be removed by hand.

6.1.3 Site Rehabilitation and Maintenance

Because short-leaved dudleya will be established in existing (albeit somewhat disturbed) habitat occurring on intact soils, no soil testing will be necessary. The sites have non-native weedy species particularly annual grasses that must be controlled and replaced by native species. No native species are anticipated to be displaced by this restoration project, which is designed to enhance the site. The intact sites most likely support the

mycorrhizal associations important to the successful establishment of native plant species.

Exotic plants will be controlled throughout the length of the program. Non-native species will be removed primarily using hand tools, although some plants may need to be controlled by Roundup® or another appropriate herbicide sprayed by a licensed pesticide applicator under the supervision of the project biologist. As exotics are removed, these areas will receive hand-broadcast native seed collected including the short-leaved dudleya from on-site in order to enhance the quality of the habitat. Native seeds other than short-leaved dudleya will not be placed directly in the dudleya planting sites in order to avoid competition early in the establishment process. Also, seeds will not be raked into the soil, as this action enhances weed germination and competition. The use of supplemental water for native species other than the dudleya is not anticipated because native seeds will be broadcast during the winter rainy season.

The restoration sites should be actively maintained for a minimum of five years depending on funding. If adequate money is not available in the early years, then the focus should be placed on limiting disturbance to habitat and restoration activities may be extended for a longer period at any particular site. Maintenance will commence following placement and establishment of dudleya seed, transplanted adults, and leaf cuts, if they are used. Maintenance activities will include continued control of exotics and visual inspections to identify incipient problems such as herbivory or vandalism. The monitoring biologist shall direct weeding crews to remove weeds and determine which plants require control during the five-year maintenance period. The need for weeding is expected to decrease substantially by the end of the five-year period, provided successful habitat restoration has been achieved.

6.1.4 Dudleya Seed Collection

After an MOU agreement for seed collection of this state listed species has been negotiated with CDFG, seeds from individual short-leaved dudleya found in the three subpopulations on Carmel Mountain should be collected annually. Seeds from individuals of short-leaved dudleya found in the populations on Carmel Mountain will be collected in the summer. Dried inflorescences should be collected and placed in paper envelopes, which allow for the evaporation of residual moisture to prevent molding. Seeds are then stored in a cool, dark location to prevent desiccation and maintain viability. Dudleya seeds remain viable for many years under these conditions (Dodero 1995) and germination tests using seeds from *Dudleya multicaulis*, a closely related species, indicate no significant reduction in viability over a two-year storage period.

The seed would be used to propagate plants at a nearby growing facility for later translocation to the Preserve and also to grow plants that will be used to produce seed for

direct application to the restoration sites and for dispersal into appropriate but currently unoccupied areas of the Preserve.

To ensure the maintenance of genetic diversity in the enhanced and newly created subpopulations, seed should be collected from individuals in each subpopulation. In the absence of any genetic information it is probably the best strategy to keep seeds and plants from each subpopulation separate to maintain any genetic differentiation between the subpopulations. Plants propagated from these seeds should only be used in the same subpopulation area that they originated from.

For newly created populations disjunct from the existing sites, plants and seeds from the three different subpopulations could be mixed to create as genetically diverse populations as possible. In theory then the created populations would have the best chance of having at least some individuals that are adapted to the varying types of conditions that may be present at the proposed creation/expansion sites. Past experience with translocation of Blochman's dudleya suggests that plants will do well at the new sites as long as they are properly planted and herbivory is not too severe and weeds are controlled (RECON 1996 and 2001).

6.1.5 Propagation

To propagate short-leaved dudleya for translocation and seed production the following methods should be used. Salvaged soil collected on-site can be placed in standard greenhouse flats to a depth of approximately one inch. Flats should be filled with soil that has a higher clay content than pure sand. The clay is a more stable growing medium than sand and will be easier to transplant into the restoration sites. Clumps of plants grown in sand have a tendency to break apart and will not transplant well.

Soil could be salvaged from nearby locations with the same soil type that are slated for development. Another option would be to salvage soil from the cut edge of the mesa adjacent to the park where the soil has already been disturbed by grading activities.

The dried dudleya fruits can be broken apart by hand to release the seeds that are then sprinkled on the surface of the moist soil. Because of their small size the short-leaved dudleya seeds should not be covered with any soil. The seeds should be immediately watered with a fine mist several times a day to keep them continuously moist for a period of approximately two weeks although in the cool fall and winter seasons most viable dudleya seeds should germinate within one week. To produce plants that will attain the greatest possible size during the first growing season short-leaved dudleya seed is best sown after the first cold front of the season has past, usually in late October. Plants started at that time have the potential to reach flowering size in cultivation in approximately six months.

The sowing of the seed in the flats should be covered with shade cloth to reduce evaporative water loss from the soil and to minimize mechanical disturbance from watering. Each flat requires weeding as needed throughout the growing season. Supplemental watering should be given as needed during dry periods and small seedlings should never be allowed to dry out during the growing season. By late April, supplemental watering should be discontinued to allow the plants to enter their normal dormancy cycle, which starts at the onset of the summer drought.

If flats are intended for translocation into sites with thin soil, the amount of soil placed in the flats can be adjusted to accommodate the depth of the soil at the translocation site. The soil in the flats should always be somewhat more shallow than the soil at the translocation site. The reason for this is that the translocated plants should be planted flush with or slightly below the existing soil surface to ensure that the newly translocated plants are in a slightly depositional rather than an erosional environment. If the underground stems are exposed above the soil surface by erosion the plants are likely to die. Short-leaved dudleyas and closely related species are adapted to live in areas where there is slow deposition of sand and clay (Doderer 1995). The plants can keep pace with the deposition of soil by elongating their stem upward through the soil. As long as deposition of soil is not too rapid, the plants can grow well in this type of environment.

The goal of any translocation or habitat restoration plan is the establishment of a self-sustaining population with a minimum population size which enables the species to retain the genetic resources necessary to adapt to changing environmental conditions (Guerrant 1996). To achieve the goal of creating a self-sustaining population, up to three establishment methods could be used: hand broadcasting of dudleya seed to weed-free areas, planting individuals germinated from seed collected on-site or if necessary planting of whole leaves that develop into new plants after a period of a few weeks. Each method of establishment, whether by seed, cuttings, or transplants, may have drawbacks, depending on site-specific conditions (Guerrant 1996).

Previous restoration experience with Blochman's dudleya, a closely related species, indicates propagation of seed-grown plants in cultivation results in the greatest survivorship of seedlings (approximately 90 percent) over direct seeding (approximately 10 percent). Because of the very thin soils or the presence of intact microbiotic crusts at some of the enhancement sites, flats of cultivated seedlings may not be able to be planted in many locations that otherwise have high restoration potential. In thin soil areas direct seeding may be the only method available to establish plants because flats of seedlings will not be able to be successfully translocated into soil only one centimeter thick. Direct seeding should also be used where planting of cultivated short-leaved dudleyas would impact existing microbiotic crusts.

Another option to solve the problem of thin soils is to bring in relatively small amounts of soil to replace soil lost through road grading and erosion in Subpopulations 2 and 3 on

Carmel Mountain. Small amounts of salvaged sandy soil could be collected from the graded edge of the Neighborhood 8A park where it abuts the Preserve and this soil could be thinly spread across the graded road areas that have little or no soil. Soil could be placed up to one inch deep to restore growing areas for the dudleya. At this maximum depth the soils would still be too thin to support shrubs but the short-leaved dudleya is adapted to these conditions. The intent is to establish plants wherever the habitat is appropriate within the restoration sites using the methods and criteria outlined above.

6.1.6 Introduction of Other Plant Species

The following herbaceous species are suitable for use in restored and enhanced short-leaved dudleya habitat: Cleveland's shooting stars, dot-seed plantain, pygmy weed, skunkweed, spineflower, herba impia, popcorn flower, and everlasting nest straw. Other associated herbaceous species may also be suitable for revegetation around newly created dudleya populations. All native plant species intended for reintroduction into the restoration and enhancement sites should be collected within the Preserve and hand broadcast. Since the dudleya habitat areas to be restored relatively small, sufficient seed can probably be collected in the vicinity of Carmel Mountain for hand broadcast. Seeds of other plant species directly into newly planted short-leaved dudleya patches to keep competition low. Seeding should be conducted in the fall or early winter just prior to anticipated rainfall. Timing seed dispersal to coincide with rainfall events reduces the amount of time the subject to herbivory and fungal attack and therefore is likely to increase germination success.

6.2 Maintenance of Enhancement and Restoration Sites

Exotic plants will be controlled throughout the length of the program. Non-native species will be removed primarily using hand tools, although some plants may need to be controlled by Roundup® or another appropriate herbicide sprayed by a licensed pesticide applicator under the supervision of the project biologist. Herbicides proposed for use in the Preserve must be on the pre-approved Park and Recreation list.

As exotics are removed, these areas will receive hand-broadcast native seed collected including the short-leaved dudleya from on-site in order to enhance the quality of the habitat. Native seeds other than short-leaved dudleya will not be placed directly in the dudleya planting sites in order to avoid competition early in the establishment process. Also, seeds will not be raked into the soil, as this action enhances weed germination and competition. The use of supplemental water for native species other than the dudleya is not anticipated because native seeds will be broadcast during the winter rainy season.

The restoration sites should be actively maintained for a minimum of five years depending on funding. If adequate money is not available in the early years, then the focus should be placed on limiting disturbance to habitat and restoration activities may be extended for a longer period at any particular site. Maintenance will commence following placement and establishment of dudleya seed, transplanted adults, and leaf cuts, if they are used. Maintenance activities will include continued control of exotics and visual inspections to identify incipient problems such as herbivory or vandalism. The monitoring biologist shall direct weeding crews to remove weeds and determine which plants require control during the five-year maintenance period. The need for weeding is expected to decrease substantially by the end of the five-year period, provided successful habitat restoration has been achieved.

In addition, exotic species shall be controlled and replaced with native species by hand broadcasting seed.

6.3 Monitoring of Enhancement and Restoration Sites

6.3.1 Planting and Seeding

After initial planting, the site will be checked twice a week by the project biologist for the first two months, once a week for the next four months, and monthly thereafter to determine if seeding and plantings are successful or if remedial measures including hand irrigation is needed.

Other site problems such as vehicle damage and erosion shall be reported to the City of San Diego and the Wildlife Agencies with recommended remedial measures.

6.3.2 Success Criteria

The success of the population expansion program should be evaluated in light of four goals, which include abundance, extent, resilience, and persistence (Pavlik 1996). The goal of maintaining abundance can be fulfilled by introducing large numbers of plants and propagules into the new site. Extent refers to the number and distribution of populations of a particular species. Resilience is maximized by maintenance of genetic variation, resistance to environmental perturbation, and ability of the plant to become dormant during unfavorable conditions. Persistence of populations is more likely when there is microhabitat variation within the translocation site and the natural community which the species occurs in is maintained.

The goal of the population expansion project is to create viable reproducing populations of short-leaved dudleya which are large enough to survive environmental perturbations

and persist for the foreseeable future. Created populations should consist of a minimum of approximately 10,000 individuals. Specific success criteria have been established for enhancing and expanding the numbers of short-leaved dudleya on the Carmel Mountain Preserve. These criteria should be the success goals required of the consultant, agency, or non-profit organization charged with implementing the short-leaved dudleya population expansion project:

If, at end of the five-year period, the population of short-leaved dudleya at the new sites equals or exceeds 10,000 individuals (all age classes), with a minimum of 2,500 flowering plants (in any of the five years) then the expansion effort shall be deemed successful. No further transplanting, seeding of short-leaved dudleya, or other native plant species would be required. Monitoring and control efforts for exotic plants shall continue according to the MSCP guidelines. Since the short-leaved dudleya is a state-listed plant, the project biologist in coordination with the City of San Diego and CDFG plant ecologists will conduct an annual review to assess the effectiveness of restoration and weeding efforts. The long-term management of the translocation/restoration areas will be performed in accordance with other management activities presented in this Management Plan for Carmel Mountain and Del Mar Mesa Preserves.

6.3.3 Reports

Annual reports will be submitted by September 30 of each year of the program, until the population reaches the success goals, at which time monitoring and reporting will decrease to once every five years for 20 years. Monitoring will then continue or end, based on the results of the 20 years of monitoring. The decision will be that of the Habitat Manager, based on the best science available at the time.

Reports will include the results of control efforts for exotic plants, native seed collection and seeding programs, photodocumentation of the restoration site from permanent locations taken annually, total counts of short-leaved dudleya actively growing each year, total counts of the number of flowering individuals, and annual assessments of the general health and condition of translocated short-leaved dudleya. Annual reports will be submitted to the City of San Diego and the CDFG Natural Heritage Division-Plant Conservation Program.

6.3.4 Restorationist Qualifications

The restoration project biologist should have a minimum of five years of general restoration experience in coastal southern California and a minimum of three years of experience with the monitoring, propagation, translocation of short-leaved dudleya or closely related species. The project biologist should be able to demonstrate an understanding of the special growing requirements of short-leaved dudleya as they relate to the restoration and enhancement of this state listed endangered species.

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Vernal Pool
Enhancement and
Restoration Plan for the
Carmel Mountain and
Del Mar Mesa
Preserves, San Diego,
California

Prepared by

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1.0 San Diego Mesa Hardpan Vernal Pools

1.1 Introduction

San Diego mesa hardpan vernal pools are shallow, isolated, ephemeral wetlands. The micro-topography surrounding vernal pools often consists of small mima mounds or hummocks. Vernal pools fill with water during winter rains and the water evaporates after the rains cease. Plants in vernal pools may be aquatic or may germinate following the drying of the pool. San Diego Mesa hardpan vernal pools have a characteristic suite of plant and animal species. Hardpan vernal pools are primarily found north of Otay Mesa (Holland 1986). Vernal pools are considered to be sensitive habitat by local, state, and federal governments, and it is estimated that over 95 percent of the vernal pool habitat in San Diego County has been destroyed (Bauder 1986).

1.2 Recovery Criteria and Goals

1.2.1 USFWS Recovery Criteria for San Diego Mesa Hardpan Vernal Pools

The Recovery Plan for Vernal Pools of Southern California (USFWS 1998) describes actions USFWS believes are needed to recover or protect the federally listed species that occur in vernal pools. The Recovery Plan addresses three listed vernal pool species that occur within the Carmel Mountain or the Del Mar Mesa Preserve: San Diego fairy shrimp (*Branchinecta sandiegonensis*), San Diego button-celery (*Eryngium aristulatum* var. *parishii*), and San Diego mesa mint (*Pogogyne abramsii*).

The criteria and goal of the Recovery Plan is to increase and stabilize the populations of these species so they can be downlisted from endangered to threatened. Population trends must be shown to be stable or increasing for a minimum of 10 consecutive years prior to USFWS considering the reclassification of the listed species. Monitoring should continue for a period of at least 10 years following reclassification to ensure population stability.

This management plan addresses three actions identified by USFWS as being needed to move the populations toward recovery:

- a. Conduct surveys and research essential to the conservation of these species (described on p. 69 of the Recovery Plan),

- b. Where necessary, reestablish vernal pool habitat to the historical structure and composition to increase genetic diversity and population stability (described on p. 71 of the Recovery Plan), and
- c. Manage and monitor habitat and listed species (described on p. 72 of the Recovery Plan).

As identified in the Recovery Plan, this Vernal Pool Habitat Restoration section of this Management Plan addresses the reestablishment of the physical and biological characteristics of vernal pool habitat such as topography, hydrology, soil properties, water quality, nutrient cycling, species diversity, and species interactions to what they were prior to disturbance.

1.2.2 Goals of Vernal Pool Restoration and Enhancement Program on the Carmel Mountain and Del Mar Mesa Preserves

The restoration plans presented here for vernal pools on Carmel Mountain and Del Mar Mesa are conceptual. Additional detailed information should be gathered prior to implementation of any restoration activities for vernal pools including conducting focused surveys for listed fairy shrimp and listed and sensitive vernal pool plants. In addition, detailed topographic information should be gathered for each proposed restoration area and this data should be used to create a grading plan for implementation. Sensitive species survey data and topographic information will be included in a detailed restoration plan to be prepared for each site and approved by the wildlife agencies and land managers prior to implementation.

The goals of this Plan are to:

- a. Preserve, protect, and restore vernal pool habitat in the Carmel Mountain and Del Mar Mesa Preserves.
- b. Restore natural vernal pool functions and values in degraded and damaged pools.
- c. Minimize and try to eliminate vehicle, horse, and foot traffic disturbance of vernal pool habitat.
- d. Maintain and expand self-sustaining populations of vernal pool plant and animal species including listed and sensitive taxa as appropriate within the Carmel Mountain and Del Mar Preserves to ensure their long-term existence.
- e. Restore the associated disturbed upland habitat around the vernal pools within the Carmel Mountain and Del Mar Mesa Preserves to reduce weed invasion into the vernal pools.

To successfully attain the goals outlined above, the following management actions must be implemented:

- When possible, reroute foot, bike, and horse trails around existing vernal pool habitat areas.
- Close and restore roads that bisect vernal pool habitat in locations that are not part of the designated recreational trails system or roads that provide access routes for SDG&E and private inholdings.
- Erect wooden fences and repair existing barriers to discourage off-trail recreational travel.
- Recontour depressions to a more natural shape in roads and trails that are not part of the designated trail system.
- Repair tire ruts with hand tools in areas where repair activities will not adversely affect existing sensitive species or adjacent microbiotic crusts.
- Collect 5 percent or less of the seed crop from the Carmel Mountain and Del Mar Mesa vernal pool plant species for redistribution into restored pools.
- Use collected seed to inoculate restored pools with appropriate vernal pool flora.
- Control exotic plants through hand removal from pool basins and control weeds in surrounding uplands.

2.0 Vernal Pool Resources on the Carmel Mountain Preserve

Approximately 93 vernal pool depressions and seeps have been mapped on Carmel Mountain. Vernal pools mapping for this plan was provided by the City of San Diego and revised in part by RECON (Figures A6-1a and A6-1b). Vernal pools and seeps on the Torrey Surf property were mapped by Helix Environmental Inc. The majority of the pools are located in the southwestern portion of the mesa top (see Figures A6-1a and A6-1b).

Mima mound topography typical of other vernal pool areas in San Diego County does not exist on Carmel Mountain. The vernal pools are depressions on the mesa top. Generally, the vernal pools are in openings of the surrounding southern maritime chaparral and adjacent to openings around mesic meadows, seeps, and ashy spike-moss-dominated areas (see Figures A6-1a and A6-1b).

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Figure A6-1a; COLOR—OVERSIZE

Vernal Pool Locations on Carmel Mountain Preserve
(Map 1)

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Figure A6-1b; COLOR—OVERSIZE

Vernal Pool Locations on Carmel Mountain Preserve
(Map 2)

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2.1 Existing Conditions

2.1.1 Disturbances

The vernal pools of Carmel Mountain have suffered different levels of disturbance from road grading and vehicle traffic particularly damaging during wet periods, and creation of new trails by mountain bikes and equestrian use. Levels of damage to the pools range from relatively undisturbed (a few pools) to the other extreme where pools have been virtually eliminated by road grading and trail use. The relatively undisturbed pools are located away from roads and trails in openings in the maritime chaparral vegetation. Other pools have single or multiple sets of tire tracks, but otherwise still support vernal pool indicator species such as woolly marbles (*Psilocarphus brevissimus*). In some cases, depressions along the graded roads that have been impacted by vehicle traffic each wet season, have no or few vernal pool plant indicator species, although the areas have the necessary hydrology to support those indicator species. Western spadefoot (*Spea hammondi*) tadpoles have been observed in depressions located in roads, and the tadpoles have been impacted in the past by unauthorized vehicle traffic. In some cases, very small remnant populations of woolly marbles are found in some of these the road depressions. Water starwort can be found growing in and along the edges of the road where water seeps along the hardpan from the somewhat higher elevations on Carmel Mountain.

2.1.2 Hydrology

The maritime chaparral areas on the mesa top are gently tilted to the west and south and these higher areas act as water catchment areas during the wet season. This rainwater infiltrates the topsoil and then eventually reaches the impervious hardpan. Rainwater appears to seep and percolate downhill along the upper surface of the hardpan as subsurface flows into the pools located in flatter portions of the mesa near the southwestern and southern periphery of the cemented sandstone strata. These seeps often stay wet well after rainfall has stopped. This subsurface flow may increase the amount of ponding in the some of the pools beyond that apparent from the visible surface watershed of individual pools.

Roads and trails that have removed all of the topsoil may have the effect of redirecting or channeling flow in unnatural patterns so that some pools may not be ponding much as they once did. Depressions located in graded roads may pond for longer periods because the road grading has either created or deepened existing depressions. In addition the compacted roads possibly direct both more surface flows into these areas than would occur naturally.

2.1.3 Vernal Pool Plant Species

Species dominating these pools are woolly marbles, stone-crop (*Crassula aquatica*), flowering quillwort (*Lilaea scilloides*), and water starwort (*Callitriche marginata*) (

Table A6-1). Less common vernal pool species include the Orcutt's brodiaea, chaffweed (*Centunculus minimus*), waterwort (*Elatine brachysperma*), and California adder's-tongue (*Ophioglossum californicum*).

Additional general wetland species present on Carmel Mountain include pale spike-rush (*Eleocharis macrostachya*), mariposa rush (*Juncus dubius*), and toad rush (*J. bufonius*). Areas that can best be described as mesic meadows and seeps, dominated by mariposa rush and blue-eyed grass (*Sisyrinchium bellum*), transition into vernal pool habitat and the herbaceous communities dominated by ashy spike-moss, shooting stars, dot-seed plantain, popcorn flower, wavy-leaved soap plant, and other herbaceous species as well as southern maritime chaparral vegetation.

No listed vernal pool plant species are historically known from Carmel Mountain. Redding soils, which are known to support populations of San Diego mesa mint in other coastal mesas in central San Diego, are limited in extent on Carmel Mountain and are located to the southeast of the main vernal pool complex on the western and central portions of the mesa top. The primary area of vernal pools on Carmel Mountain are found on Carlsbad gravelly loam soils located above the impermeable sandstone terrace. Like San Diego mesa mint, San Diego button celery and spreading navarretia are not known to have been present historically on Carmel Mountain.

Sensitive animal species associated with vernal pool habitat on Carmel Mountain include the listed San Diego fairy shrimp discussed below, as well as the two-striped garter snake (*Thamnophis hammondi*) and western spadefoot.

2.1.4 Endangered Vernal Pool Species on Carmel Mountain

The San Diego fairy shrimp is federally listed as endangered and is covered by the City of San Diego's Multiple Species Conservation Program (MSCP; 1995). This species is restricted to vernal pools in coastal southern California and south to northwestern Baja California, Mexico (USFWS 2000). The life cycle of fairy shrimp is relatively simple, with larvae hatching out of dormant cysts after being covered with water for a prescribed period of time, developing into adults, and mating and laying eggs before the pool dries. The development time is influenced both by the water temperature and the species-specific responses to environmental cues including water chemistry. San Diego fairy shrimp are found in the spring in vernal pools and other ponded areas that are generally

Table A6-1; **ONE PAGE**

less than 30 centimeters deep. This species takes between 3 and 8 days to hatch and development to the adult stage takes between 7 and 20 days.

3.0 Vernal Pool Resources on the Del Mar Mesa Preserve



Photograph 6-1: Vernal Pool on the Portion of Del Mar Mesa Preserve Owned by CDFG

Vernal pools are shallow, isolated, ephemeral wetlands. The microrelief surrounding vernal pools typically consists of small mima mounds or hummocks. Vernal pools fill with water during winter rains and the water evaporates after the rains cease. Plants in vernal pools may be aquatic or may germinate following the drying of the pool. San Diego mesa hardpan vernal pools have a characteristic suite of plant and animal species. Hardpan vernal pools are primarily found north of Otay

Mesa (Holland 1986). Vernal pools are considered to be sensitive habitat by local, state, and federal governments, and it is estimated that over 95 percent of the vernal pool habitat in San Diego County has been destroyed.

Sensitive plant species occurring in the vernal pools on Del Mar Mesa Preserve include San Diego button celery and San Diego Mesa mint. Sensitive animal species within vernal pool habitat on the Preserve include the two-striped garter snake (*Thamnophis hammondi*), western spadefoot (*Spea hammondi*), and San Diego fairy shrimp. Other sensitive species typically associated with vernal pools include California adder's-tongue, Orcutt's brodiaea (*Brodiaea orcuttii*), and San Diego goldenstar (*Muilla clevelandii*).



Photograph 6-2: Vernal Pool on Property Owned by CDFG on Del Mar Mesa Preserve

Numerous vernal pools are on Del Mar Mesa Preserve within areas mapped as chamise chaparral and southern mixed chaparral. Species dominating these pools are water starwort (*Callitriche marginata*), stone-crop (*Crassula aquatica*), woolly marbles (*Psilocarphus brevissimus*), and grass poly (*Lythrum hyssopifolium*). Some of the larger and deeper pools are distinguished by spikerush (*Eleocharis* sp.). Smaller populations of California adder's tongue are present in some pools, and San Diego button-celery is common in many of the pools. San Diego mesa-mint is found in some of the pools as

well. *Downingia* (*Downingia cuspidata*) and little mouseling are present in the southeastern pool complex.

4.0 Vernal Pool Restoration Program for the Carmel Mountain Preserve

Lands formerly supporting San Diego mesa hardpan vernal pool habitat, eliminated by topographic disturbance and the loss of hydrologic ponding characteristics, have the potential to be restored. The vernal pools to be restored on Carmel Mountain will support vernal pool indicator species historically known to be present. Plants on the list of vernal pool indicator species (see Table A6-1) should be considered for reintroduction into restored vernal pools on Carmel Mountain.

Since the listed vernal pool plant species are not known to have occurred historically on Carmel Mountain no listed plant species are proposed for introduction to Carmel Mountain. Restored pools that do not currently support the federally listed San Diego fairy shrimp could be inoculated with shrimp cysts after reconstruction with USFWS approval.

Virtually all vernal pools on Carmel Mountain have been disturbed and these pools would all benefit from the proposed restoration program. The pools with the highest priority for restoration activities are located in and adjacent to roads and trails that are not part of the proposed trail system for Carmel Mountain. Restoration of pools and depressions present in and adjacent to roads and trails that are part of the proposed trail system have a lower priority for restoration due to potential conflicts with recreational uses and the necessity to maintain access routes for SDG&E and to private inholdings. Restoration of vernal pool resources in the SDG&E access roads would only be done if these roads are no longer needed by SDG&E or by private landowners to access their property.

The potential vernal pool restoration sites on Carmel Mountain are located in the southwest and southern portions of the Carmel Mountain Preserve (Figures 6-1a-b). Each mapped pool is numbered in these figures and Table A6-2 provides corresponding recommendations for potential vernal pool restoration activities for each numbered pool. Figures 6-2a-f also depict potential trail system rerouting possibilities around vernal pools. This proposed rerouting is intended to minimize impacts of recreational uses to sensitive vernal pool resources. Only trails that cross through vernal pools not located in the SDG&E and private landowner access roads are proposed for rerouting.

Table A6-2; **PAGE 1 of 5**

Table A6-2; **PAGE 2 of 5**

Table A6-2; **PAGE 3 of 5**

Table A6-2; **PAGE 4 of 5**

Table A6-2; **PAGE 5 of 5**

Figure A6-2a; COLOR—OVERSIZE

Potential Trail Rerouting Around Vernal Pools with the
Potential for Restoration on Carmel Mountain
Preserve (Map 1)

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Figure A6-2b; COLOR—OVERSIZE

Potential Trail Rerouting Around Vernal Pools with the
Potential for Restoration on Carmel Mountain
Preserve (Map 2)

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Figure A6-2c; COLOR—OVERSIZE

Potential Trail Rerouting Around Vernal Pools with the
Potential for Restoration on Carmel Mountain
Preserve (Map 3)

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Figure A6-2d; COLOR—OVERSIZE

Potential Trail Rerouting Around Vernal Pools with the
Potential for Restoration on Carmel Mountain
Preserve (Map 4)

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Figure A6-2e; COLOR—OVERSIZE

Potential Trail Rerouting Around Vernal Pools with the
Potential for Restoration on Carmel Mountain
Preserve (Map 5)

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Figure A6-2f; COLOR—OVERSIZE

Potential Trail Rerouting Around Vernal Pools with the
Potential for Restoration on Carmel Mountain
Preserve (Map 6)

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Restoration activities that would be beneficial to individual vernal pools are briefly described in Table A6-2 including recommended weeding activities and topographic recontouring, if this restoration activity would benefit and restore more natural hydrologic conditions. The recommendation provided in Table A6-2 should be reevaluated at such time that a detailed restoration plan is prepared for each restoration site. In a few cases, previously mapped pools could not be relocated with certainty and this fact is also noted in Table A6-2.

Additional details and recommendations regarding establishment of vernal pool target species maintenance and monitoring schedules Implementation

5.0 Vernal Pool Resources on Del Mar Mesa

On Del Mar Mesa vernal pools occur in openings in the surrounding chaparral vegetation including chamise chaparral, southern mixed chaparral and scrub oak chaparral communities. Table A6-3 list vernal pool indicator species present in the area. Detailed vernal pool and depression mapping for restoration purposes was prepared for pools located in existing roads. Existing vernal pools located away from roads have not previously been mapped and mapping all the pools on Del Mar Mesa was beyond the scope of this Plan.

Intact vernal and relatively undisturbed vernal pools located and mima mound topography is associated with vernal pools in portions of Del Mar Mesa, but the mounds are not as readily apparent as in other portions of the County due to the dense upland vegetation particularly in the scrub oak community. Vernal pools on Del Mar mesa are known to support State and Federally listed pool species including San Diego mesa mint, San Diego button celery and spreading navarretia and another sensitive vernal pool species, little mousetail (*Myosurus minimus* var. *apus*).

Other sensitive species typically associated with vernal pools on Del Mar mesa include California adder's-tongue, Orcutt's brodiaea, and San Diego goldenstar. Sensitive animal species associated with vernal pool habitat on Del mar mesa include the two-striped garter snake, western spadefoot, and the federally endangered San Diego fairy shrimp, discussed below.

There are numerous vernal pools present on mesas within the eastern third of the Del Mar Mesa Preserve and these vernal pools have a better developed vernal pool flora than the Carmel Mountain pools. Species dominating these pools are San Diego button celery, San Diego mesa mint, water starwort, stone-crop, and woolly marbles. Some of the larger and deeper pools are distinguished by spikerush (*Eleocharus* sp.). Smaller

Table A6-3; **PAGE 1 of 2**

Table A6-3; **PAGE 2 of 2**

populations of California adder's-tongue are present in some pools. *Downingia* (*Downingia cuspidata*) and little mousetail are present in the southeastern pool complex.

5.1 Current Status of Vernal Pools on Del Mar Mesa

Numerous vernal pools occur on Del Mar mesa in several areas (see Figures 10-1a and 10-1b, and Figures 10-2 through 10-3a–d of the Carmel Mountain and Del Mar Preserves Resource Management Plan). Vernal pools located away from existing roads and trails in the chaparral vegetation are the least disturbed and weedy. A portion of the vernal pools on Del Mar Mesa have been damaged by road grading, off-road vehicle traffic, and creation of new trails by mountain bikes. Levels of damage to the pools ranges from pools that are undisturbed relatively to pools that have been nearly eliminated by past road grading and associated vehicle traffic. Pools that have been the most severely impacted are located in and adjacent to roads and unauthorized trails through the California Department of Fish and Game (CDFG) vernal pool preserve area and along the graded access roads west of the preserve. In some cases vernal pools along the graded roads have been bisected and formerly contiguous sections of pools are now divided by the access road.

5.1.1 Endangered and Threatened Vernal Pool Species on Del Mar Mesa

The restored vernal pools will be designed to support San Diego Mesa mint, San Diego button celery, spreading navarretia, and other vernal pool indicator plant species. Table A6-3 lists vernal pool indicator species for Del Mar Mesa.

5.1.1.1 San Diego Mesa Mint (*Pogogyne abramsii*)

San Diego mesa mint is a member of the Lamiaceae family. This annual herb flowers from April to June and is found only in vernal pools within San Diego County. This species is state and federally listed as endangered and is a CNPS *Inventory* (Skinner and Pavlik 1994) List 1B species. San Diego mesa mint is covered under the MSCP and is considered a narrow endemic species.

5.1.1.2 San Diego Button Celery (*Eryngium aristulatum* var. *parishii*)

San Diego button-celery is a member of the parsley family (Apiaceae). This annual/perennial herb is federally listed as endangered, state listed as endangered, and a CNPS List 1B species. San Diego button celery was designated as a federally listed endangered species on August 3, 1993 (USFWS 1993). It is also a covered species in

the MSCP. San Diego button-celery is an annual/perennial species restricted in distribution to Riverside County, San Diego County, and Baja California, Mexico, where it occurs in vernal pools. *Eryngium* is one of the few perennial species found in vernal pools. While the plant can reproduce clonally, it relies largely on seed germination for successful reproduction. This species has become endangered from habitat loss and fragmentation over recent decades.

5.1.1.3 Spreading Navarretia (*Navarretia fossalis*)

Spreading navarretia is a member of the phlox family (Polemoniaceae). This annual herb is federally listed as threatened, and a CNPS List 1B species. Spreading navarretia was designated as a federally listed threatened species on October 13, 1998 (USFWS 1998). It is also a covered species in the MSCP. Spreading navarretia is restricted in distribution to Riverside County, San Diego County, and Baja California, Mexico, where it occurs in vernal pools.

5.1.1.4 San Diego Fairy Shrimp (*Branchinecta sandiegonensis*)

The San Diego fairy shrimp is federally listed as endangered and is covered by the City of San Diego's MSCP (1995). This species is restricted to vernal pools in coastal southern California and south to northwestern Baja California, Mexico (USFWS 2000). The life cycle of fairy shrimp is relatively simple, with larvae hatching out of dormant cysts after being covered with water for a prescribed period of time, developing into adults, and mating and laying eggs before the pool dries. The development time is influenced both by the water temperature and the species-specific responses to environmental cues including water chemistry. San Diego fairy shrimp are found in the spring in vernal pools and other ponded areas that are generally less than 30 centimeters deep. This species takes between 3 and 8 days to hatch and development to the adult stage takes between 7 and 20 days.

5.1.2 Proposed Vernal Pools Restoration Areas

5.1.2.1 Vernal Pool Restoration Program for Del Mar Mesa

Lands formerly supporting San Diego mesa hardpan vernal pool habitat, eliminated by topographic disturbance and the loss of hydrologic ponding characteristics, will be restored. The vernal pools to be restored on Del Mar mesa will support vernal pool indicator species historically known to be present. Plants on the list of vernal pool indicator species for Del Mar Mesa (see Table A6-3) should be considered for reintroduction into restored vernal pools on Del Mar Mesa.

The potential to re-expand populations San Diego Mesa mint, San Diego button celery, spreading navarretia and other vernal pool indicator plant species is high. Restored

pools that do not currently support the federally listed San Diego fairy shrimp (*Branchinecta sandiegonensis*) could be inoculated with shrimp cysts after reconstruction with USFWS approval.

RECON has mapped 93 vernal pools and depressions within the unauthorized road/trail on CDFG land and the SDG&E access roads to the west (Figures A6-3a–h). The pools that should have the highest priority for restoration activities are located in the CDFG preserve along the unauthorized road/trail east-west that traverses the site.

On Del Mar Mesa Preserve, the southeastern-most road accesses the California Department of Transportation (Caltrans) vernal pool reserve and ends at the southeastern corner of the site. Many of the roads and trails bisect vernal pool habitat within the chaparral. Vernal pools are located alongside and in some cases within the roads throughout the preserve. Deep depressions and road ruts have been made by vehicles in these areas during the wet seasons. The southeastern unauthorized road/trail traverses the fenced off vernal pool reserve and is recommended for future formal closure. Trespass mountain bike activity and foot traffic are the primary causes of disturbance in the CDFG preserve.

The portion of SDG&E access road that heads north through the preserve bisects vernal pools habitat. Restoration of pools in and adjacent to roads that are part of the proposed trail system are of lower priority for restoration due to the necessity to maintain access routes for SDG&E and to private inholdings. Table A6-4 lists the recommended restoration tasks for the 44 mapped depressions in the east-west road that traverses the CDFG vernal pool preserve and the approximately 44 additional depressions located in existing SDG&E access roads.

5.1.2.2 Past Vernal Pool Restoration Activities at Del Mar Mesa

In 1986, 40 artificial vernal pools were created by Caltrans on Del Mar Mesa. This project was intended to mitigate for loss of San Diego mesa mint that was impacted by the construction of Highway 52. A detailed summary of the restoration activities performed as part of this Caltrans mitigation program can be found in Black and Zedler 1998.

5.1.2.3 Management of Existing Vernal Pools on Del Mar Mesa

Long-term management of existing vernal pools not requiring restoration should focus on controlling recreational access and implementing the weeding program described later in this chapter. Pools adjacent to the graded roads west of CDFG preserve will require more intensive weeding efforts than pools located away from roads. The many undisturbed pools are currently relatively weed free and land managers will need to

Figure A6-3a; COLOR—OVERSIZE

Mapped Vernal Pools with the Potential for Restoration on
Del Mar Mesa Preserve (Map 1)

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Figure A6-3b; COLOR—OVERSIZE

Mapped Vernal Pools with the Potential for Restoration on
Del Mar Mesa Preserve (Map 2)

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Figure A6-3c; COLOR—OVERSIZE

Mapped Vernal Pools with the Potential for Restoration on
Del Mar Mesa Preserve (Map 3)

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Figure A6-3d; COLOR—OVERSIZE

Mapped Vernal Pools with the Potential for Restoration on
Del Mar Mesa Preserve (Map 4)

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Figure A6-3e; COLOR—OVERSIZE

Mapped Vernal Pools with the Potential for Restoration on
Del Mar Mesa Preserve (Map 5)

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Figure A6-3f; COLOR—OVERSIZE

Mapped Vernal Pools with the Potential for Restoration on
Del Mar Mesa Preserve (Map 6)

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Figure A6-3g; COLOR—OVERSIZE

Mapped Vernal Pools with the Potential for Restoration on
Del Mar Mesa Preserve (Map 7)

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Figure A6-3h; COLOR—OVERSIZE

Mapped Vernal Pools with the Potential for Restoration on
Del Mar Mesa Preserve (Map 8)

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Table A6-4; **PAGE 1 of 4**

Table A6-4; **PAGE 2 of 4**

Table A6-4; **PAGE 3 of 4**

Table A6-4; **PAGE 4 of 4**

perform annual monitoring checks to identify and address any new weed invasion problem areas.

6.0 Vernal Pool Restoration Implementation Plan

6.1 Rationale for Expecting Implementation Success

Existing examples of vernal pool restoration projects in the San Diego region range in age from one to 20 years. In the oldest example, which was a controlled study evaluating the effects of topographic restoration and seed dispersal facilitation (Scheidlinger et al. 1985), vegetation in the restored pools and disturbed areas of the site with persisting pool hydrology was equivalent after 14 years to that of natural pools (Patterson 1995). In restoration programs conducted on Lopez Ridge (Patterson and Netting 1994a) and Naval Air Station (NAS) Miramar (Patterson and Netting 1994b) and California Terraces on Otay Mesa (RECON 1997, 2000), restoration success criteria similar to those proposed herein were met within two seasons. Other local vernal pool restoration projects in various stages of planning and implementation are being undertaken on Otay Mesa, NAS Miramar, and Camp Pendleton.

Vernal pool creation projects in California have been undertaken in many localities in the Central Valley and in Santa Barbara (Ferren and Givertz 1990). Although these projects have met with mixed success, most workers in the field agree that while self-sustaining ephemeral wetland habitat for particular target species is possible to create, this habitat should not be considered an equivalent substitute for natural habitat (Ferren and Givertz 1990). In cases where limited natural habitat is available, vernal pool recreation and restoration becomes an important method in preserving vernal pool habitat and the species that depend on it.

6.1.1 Restorationist Qualifications

The restoration project biologist should have a minimum of five years of vernal pool restoration experience in coastal southern California. The project biologist should be able to demonstrate an understanding of the special growing requirements vernal pool plant species as they relate to the restoration and enhancement of vernal pools. The project biologist or biology team must have the necessary state and federal permits to work with listed vernal pools species.

6.2 Site Preparation

6.2.1 Preliminary Design and Engineering

Conceptual planning of the restoration area involves the creation of a preliminary design for the topographic reconstruction for each vernal pool site. The reconstruction concept plan below is based in part on the re-excavation of basins that appear to have been filled with soil due to the erosion and leveling of adjacent mounds, when present. The general locations for the proposed restoration basins have been determined and mapped in the field. Detailed final grading plans should be prepared prior to implementation of restoration activities.

A topographic base map depicting 0.5-foot topographic contours from the existing surface should be prepared by a topographic engineering survey within the proposed vernal pool restoration sites. After reconstruction, the boundary of the restored vernal pools will be recorded in the field using post-processed GPS with a horizontal accuracy of less than one foot. The final grading plans will be re-plotted at 1 inch equals 40 feet, showing pool boundary, existing path and level, and finished 0.5-foot topographic contours for use in the field. Each pool boundary will be marked with contractor sand and the finished basin floor and outflow elevations will be checked with laser survey equipment.

6.2.2 Topographic Reconstruction

Vernal pools to be restored on both Carmel Mountain and Del Mar Mesa are primarily located on existing roads and trails. In general, pool basin restoration will reverse the topographic effect of disturbance on the site, consisting primarily of erosion and the filling in of the depressions. The resulting hydrologic effect of this kind of disturbance is a reduction in the capacity of the site to capture and store rainwater. The primary physical change accomplished by this project will be the removal of a portion of the fill material from the restoration areas to restore pools and possibly restore the natural hydrology of existing depressions to enhance ponding and retention of water within the preserves. On Carmel Mountain, material removed from excavated basins could be salvaged and used to cover roads and trails proposed for closure where all the topsoil has been previously removed by road grading. Use of salvaged topsoil on closed roads that have been graded to the sandstone hardpan would create better conditions for plant restoration and establishment.

On Del Mar Mesa, within the CDFG preserve, soil removed from excavated basins can be used to reconstruct low mounds on the site, where appropriate. Some vernal pools on the site are associated with mounds, while others are not. Any excess fill material not used in mound reconstruction should be removed from the site. Existing non-natural features such as roadways and deep vehicle tracks will be regraded as appropriate to

restore more natural soil conditions. Grading activities will be conducted during the fall, prior to seasonal rains, to minimize unintended compacting of the soils by grading equipment. The grading will be conducted under the direction of a qualified biologist with vernal pool restoration experience. Areas that are to remain unaffected by restoration activities will be marked prior to implementation.

Grading will be implemented using small-tracked dozers with ripping tines and slope boards, and a sheep's foot for mound construction. The grading contractor and operators will also be experienced in vernal pool restoration work. The restoration team will include a qualified surveyor to assure that the grading plan is implemented as designed.

6.2.3 Barriers

Concurrent with the implementation of the restoration grading, vehicle barriers such as wooded split rail fences will need be erected and maintained around the perimeter of the vernal pool restoration sites on Carmel Mountain. On Del Mar Mesa gates and vehicle barriers are in need of repair and enforcement patrols will be needed to reduce and minimize the ongoing vandalism to fences and gates.

Steel signs attached to the fence will provide notice that the area is an ecological preserve, notify that trespassing is prohibited, and cite penalties for trespass violation including liability for repair of any damage within the barrier such as disturbance of soil or vegetation. Signage will be provided at 200-foot intervals around the entire restoration area.

6.3 Planting and Restoration Plan

6.3.1 Reintroduction of Vernal Pool Biota

Restoration of the native vernal pool habitats within the preserves requires the reintroduction of plants and animals at the site in addition to the physical reconstruction described above. The restoration of vernal pool habitat can be greatly accelerated by the active transport of propagules from donor sites into the restored ponds (Scheidlinger et al. 1985; RECON 1999). This will be accomplished by the redistribution of seeds, spores, bulbs, eggs, and other propagules from on-site vernal pools; as well as by the translocation of the propagules of individual species from off-site habitats.

6.3.2 Seed Collection

- Prior to the initiation of grading in the restoration site, vernal pool seed collection will be conducted both at Carmel Mountain and Del Mar Mesa Preserves. It has

been experimentally demonstrated that it is best to collect seeds within five miles of the proposed restoration or enhancement site. Vernal pool indicator species listed in Table A6-1 for Carmel Mountain and Table A6-3 for Del Mar Mesa, should be considered for introduction to the created pools.

- The hand-collected vernal pool seeds would either be distributed in the basins immediately following the completion of topographic reconstruction or just prior to or after significant rain events at the discretion of the project biologist.

6.3.3 Translocation of Endangered Species

- Three listed plant species are known to currently still persist Del Mar Mesa Preserve vernal pool complex, San Diego button celery, San Diego Mesa mint and spreading navarretia. These species will be introduced into the restored pools from seed collected on site. San Diego fairy shrimp may also be introduced to restored vernal pools. As mentioned previously, San Diego fairy shrimp may be introduced into pools that do not currently support this species. Surveys determining their presence or absence will be conducted prior to this implementation.
- Less than 5 percent of the seed crop from San Diego button celery San Diego Mesa mint and spreading navarretia on the site would be collected while in fruit during the summer/fall. This seed will be stored in labeled bags or boxes that are adequately ventilated and kept out of direct sunlight in order to prevent the occurrence of fungus or excessively heating the seed. Seed will be distributed into restored pools that do not support existing populations of San Diego button celery, San Diego Mesa mint or spreading navarretia.

The San Diego fairy shrimp is known to currently still persist in the vernal pool complexes on the Preserves. Shrimp cysts would only be introduced into pools that do not support existing populations of San Diego fairy shrimp. The following translocation guidelines would be adhered to for any fairy shrimp translocation effort.

- Vernal pool soil would be collected when it is dry to avoid damaging or destroying fairy shrimp cysts, which are fragile when wet.
- A hand trowel or similar instrument shall be used to collect the sediment. Whenever possible, soil shall be collected in chunks. The trowel shall be used to pry up intact chunks of sediment, rather than loosening the soil by raking and shoveling which can damage the cysts.
- Soil containing fairy shrimp cysts shall not be introduced into pools that may already have populations of any species of shrimp.

6.3.4 Establishment of Vernal Pool Target Species

Necessary criteria for this restoration plan include enhancement of populations of three sensitive plant species in vernal pools on Del Mar Mesa: San Diego button celery, San Diego Mesa mint, and spreading navarretia. The introduction of these species will add to the plant diversity of the restored pools and enrich the vernal pool habitat. Following topographic reconstruction, the vernal pools will be inoculated with these three species' seed that will be collected from the plants in the Del Mar Mesa Preserve.

If restored pools have suitable hydrologic conditions, San Diego fairy shrimp cysts will be introduced in the vernal pools following the guidelines listed above.

6.3.5 Off-Site Translocation for Species Diversity

In order to meet target species diversity criteria, translocation of plant species listed in Table A6-1 for Carmel Mountain and Table A6-3 for Del Mar Mesa may be implemented. All species represented in Tables A6-1 and A6-3, which are present in nearby control pools but not present on the restoration site, shall be considered for introduction to the site. Species proposed for introduction to the site shall be considered to be indicative of vernal pool habitat quality and likely to have formerly occupied vernal pools on the site prior to disturbance.

6.4 Irrigation

No irrigation of restored vernal pools is recommended. Water inputs to the pools should be confined to natural rainfall.

6.5 As-Built Implementation Reporting

The first year implementation and monitoring report will include a final as-built plan. The as-built status report will include topographic mapping showing as-built topographic pool contours, basin locations, barriers, photographs of the restoration site, and a summary of project activities taken place. The status of endangered species, planting and weeding efforts, and the progress towards reaching the restoration goals will be included.

7.0 Maintenance During Monitoring Period

7.1 Maintenance Activities

Regular maintenance of the vernal pool restoration area, including intensive weeding and remedial plantings, will be required during the construction year and subsequent five-year monitoring period. On-going maintenance of the barriers and prohibition of trespassing will also be necessary. Maintenance activities will include but are not limited to the following:

- Removal of aggressive non-native weeds shall be implemented during the five-year monitoring periods for the vernal pool and adjacent upland habitats. All weeding shall be done by hand in the pool basins. In adjacent upland areas weeds can be controlled through use of approved herbicide, hand tools, or a line trimmer. The frequency and amount of weeding will depend on the rainfall patterns and other contributing factors. The preserve should be weeded at least twice a month following initial germination of non-native seedlings and should continue until all non-native species have been eliminated or restricted from setting seed.
- The monitoring biologist shall direct weeding crews to remove weeds that require control during the five-year monitoring period. The need for weeding is expected to decrease substantially by the end of the monitoring period provided successful habitat restoration has been achieved.
- All fencing and signs shall be checked and repaired as necessary once every month.
- Trash in the Preserve areas shall be removed once every month, if present.
- Any persons found willfully damaging the habitat within the preserves, including but not restricted to trash dumping, off-road-vehicle activity, trespass, plant removal, and destruction of barriers, shall be prosecuted to the full extent of the law.
- After initial seeding, the site will be checked twice a week by the project biologist for the first two months, once a week for the next four months, and monthly thereafter.
- Other site problems such as vehicle damage and erosion shall be reported to the land managers with recommendations for remedial measures.

7.2 Schedule

Maintenance activities described above will be performed at the intervals listed in Table A6-5.

**TABLE A6-5
APPROXIMATE MAINTENANCE SCHEDULE OF VERNAL POOL
RESTORATION AREAS ON CARMEL MOUNTAIN AND DEL MAR MESA PRESERVES**

Type/Task	Construction Year	Year 1	Year 2	Year 3	Year 4	Year 5
Site protection	Monthly	Monthly	Quarterly	Quarterly	Quarterly	Quarterly
Weed control	As-needed	As-needed	As-needed	Quarterly	Quarterly	Twice a year
Trash removal	Monthly	Monthly	Quarterly	Quarterly	Quarterly	Quarterly
Replanting/ seeding	Winter	Winter	Winter	Winter	Winter	Winter

8.0 Monitoring Plan

8.1 Monitoring Methods

8.1.1 Hydrology

Hydrological characteristics of the restoration site to be monitored include assessment of the depth, periodicity, and duration of inundation in the created, restored, and control pools. Precipitation is recorded at the nearest reporting weather station. Field methods for the hydrological monitoring are described below.

- Each restored pool shall be topographically mapped at 0.5-foot contour intervals.
- Each monitored pool will be measured for water depth every two weeks until the standing water is gone. Water depth will be measured using a ruler placed in the low point of the pool.
- A water-depth versus time chart shall be prepared for each monitored pool illustrating water depth and ponding periodicity over the basin low-point.

8.1.2 Biota

Biological parameters of the mitigation site to be monitored include species presence and relative cover (for plants) within each created and control basin. For target and

indicator species, a qualitative assessment of reproductive success will be made. Photodocumentation will provide a basinwide overview of the vegetative community.

- Biological observations shall be made by a field biologist trained in the methods described below and familiar with the plant taxa listed in Tables A6-1 and A6-3.
- During the aquatic phase of each monitored basin, all plant and animal taxa observed shall be recorded.
- During the aquatic phase, each monitored basin shall be dip-net sampled for aquatic invertebrates using pole-mounted dip-nets in appropriate mesh size to capture cladocerans, ostracods, branchiopods, and tadpoles at two-week intervals until there is no ponded water or the two listed shrimp species are detected, whichever comes first.
- Each monitored basin shall be sampled for plant species presence and estimated cover using a meander survey of at least a 15-minute duration per basin within 45 days of the disappearance of standing water.
- Each monitored basin shall be photographed from an established photo point during the vegetation sampling period.

8.2 Vernal Pool Performance Criteria

Intermediate yearly performance criteria demonstrating progress towards the final criteria are difficult to quantify due to the unpredictability of seasonal precipitation patterns and the sensitivity of recovering vernal pool and ephemeral wetland communities to that variability. Therefore, the yearly target criteria are semi-quantitative.

- Each of the specified success criteria will be evaluated following the completion of seasonal field monitoring to determine if the final success criteria have been met and to assess the likelihood that the criteria will ever be met (taking into account the seasonal conditions).
- The final assessment of success will be based on the combined performance over the monitoring period and an analysis of the trends established.

8.2.1 Location of Control Habitat

For the Carmel Mountain restoration program a minimum of 10 control pools shall be chosen from the least disturbed pools on Carmel Mountain as determined by the project biologist(s). For the Del Mar Mesa restoration program a minimum of 10 control pools shall be chosen from the least disturbed pools on Del Mar Mesa.

Control pools shall be chosen to include the ranges of both physical and biotic characteristics included in the long-term mitigation goals. All control pools shall support vernal pool vegetation, as defined below in the target vegetation and cover criteria.

8.2.2 Target Vegetation and Cover

- For each pool, the area of vernal pool vegetation shall be defined for purposes of this section as coincident with the area supporting a combined relative pool species cover of more than 50 percent, measured within 45 days of the disappearance of standing water. In a drought year, this criterion shall be considered to be met if the total relative cover by pool species equals that of the averaged value of control pools having similar hydrological characteristics in that year and if the qualifying area has met this criterion in a previous monitoring year.
- For each pool, the total absolute vegetative cover in areas of qualified vernal pool vegetation, not including target weed species, shall equal or exceed 50 percent of the averaged value of control pools having similar hydrological characteristics.

8.2.3 Target Plant Species Diversity

- Created basins shall support reproducing populations of a minimum number of vernal pool species equivalent to that supported by the control pools. Equivalence is met if (1) the pool species richness value for each basin (see Monitoring Plan section, below) is equal to or greater than the minimum value found in the control pools and (2) the value of pool species richness in the combined restored pools is equal to or greater than that of the control pools.

8.2.4 Target Indicator Wildlife and Endangered Shrimp Species

Characteristic animal species of vernal pools in the Carmel Mountain and Del Mar Mesa Preserve are primarily aquatic invertebrates and amphibians, although terrestrial invertebrate (especially insect) and vertebrate species are important components of the vernal pool community (Zedler 1987). Of the aquatic invertebrates, species of branchiopods, which includes fairy shrimp (Anostraca), clam shrimp (Conchostraca), and tadpole shrimp (Notostraca), are among the most distinctive inhabitants of ephemeral aquatic habitat (Pennak 1989). Unlike most aquatic invertebrates, these species are found almost exclusively in ephemeral freshwater habitats.

A number of branchiopods that are thought to occur almost exclusively in natural vernal pools have been listed or proposed for listing as endangered by the USFWS, the San Diego fairy shrimp which are found in the Del Mar mesa vernal pools.

The seed shrimp (subclass Ostracoda) is another small crustacean group that is highly distinctive in vernal pools. In the United States, freshwater seed shrimp have been comprehensively studied only in the several eastern and midwestern states and in Washington (Pennak 1989). Vernal pools in the region invariably support one or more seed shrimp species, some of which may be undescribed endemic taxa (Zedler 1989).

The target indicator wildlife species listed in Table A6-6 includes species that are found primarily in natural vernal pools within the region and are therefore considered indicators of habitat quality and restoration success.

**TABLE A6-6
TARGET INDICATOR WILDLIFE SPECIES
FOR CARMEL MOUNTAIN AND DEL MAR MESA**

Group	Species
Anostraca	<i>Branchinecta sandiegonensis</i> (San Diego fairy shrimp)
Conchostraca	<i>Cyzicus</i> sp. (clam shrimp)
Ostracoda	<i>Bradleycypris</i> sp., <i>Eucypris</i> sp., <i>Heterocypris</i> sp., <i>Lymnocythere</i> sp., <i>Pseudoilicypris</i> sp. (seed shrimp)
Dytiscidae	<i>Agabus</i> sp. (predaceous water beetles)
Pelobatidae	<i>Scaphiopus hammondi</i> (western spadefoot toad)

- Each of the created vernal pools within the restoration area shall support populations of at least two of the species listed in Tables A6-1 and A6-3 (vernal pool indicator species).
- A plant life indicator species richness value shall be determined for each created and control pool and the richness value of created pools shall be equal to or greater than that of the control pools.

8.2.5 Target Weed Species

Non-native weed species expected to be potential significant factors in the vegetation of the vernal pools include annual grasses (*Bromus* spp.), rabbitfoot grass (*Polypogon monspeliensis*), brass buttons (*Cotula coronopifolia*), loose-strife (*Lythrum hyssopifolia*), filaree (*Erodium* spp.), sand-spurrey (*Spergularia bocconii*), curly dock (*Rumex crispus*), common knotweed (*Polygonum arenastrum*), perennial ryegrass (*Lolium perenne*), and Italian ryegrass (*Lolium multiflorum*). Of these, the *Lolium* species are some of the most significant competitors with native pool vegetation as it becomes established.

- Within the vernal pool vegetation in each restored and preserved vernal pool, the relative cover of non-native species shall not exceed one percent.
- All localities of non-native plant species within the vernal pool preserves will be eliminated as a part of ongoing maintenance activities.

8.3 Target Hydrological Regime

In coastal southern California, annual precipitation is highly seasonal, with most of the rainfall occurring in the winter and early spring from December through April. On the coastal mesas, summer and fall precipitation is rare and is never of sufficient magnitude to cause ponding in natural vernal pools. The first major rainfall event of the season rarely fills natural pools; this water being used to wet and recharge surface soils dried during the summer drought. Subsequent storms charge the perched water table formed in the low-permeability soil profile of natural vernal pool landscapes, which is expressed as surface ponding in basins and topographic depressions.

The formation of a perched water table and the occurrence of surface ponding requires a soil profile with very low permeability but is also highly dependent on the topography of the site. Depressions must be present as places for the ponding to be expressed and as reservoirs to capture precipitation. The shape of the perched water table surface is influenced by the pattern and capacity of basins, interbasin soil permeability, slope of the overall site, and variations in subsoil permeability such as sand lenses and holes in the hardpan. It is this surface shape, changing over time under the influence of gravity, evaporation, and precipitation, which determines the depth and duration of ponding in the depressions.

The depth and duration of water in these temporal ponds is highly dependent upon the magnitude and number of storm events, the time interval between each event, and the climactic determinants of evaporation and transpiration (temperature, humidity, sunlight, and winds) between each storm event. Annual occurrences of winter rains in the region are remarkably variable. Therefore, the success criteria for hydrological characteristics also depend on a comparison with control habitats representing the expression of long-term performance goals during each monitoring year.

8.3.1 Watershed Analysis

The restoration of mound and basin topographic relief to the mitigation site is expected to result in the restoration of natural hydrologic conditions to the sites. Currently, graded roads and vehicles have caused siltation to the extent that of the precipitation falling on the sites is unable to pond adequately to support a diverse assemblage of vernal pool species. Topographic restoration will reestablish the ability of the landscape to capture and retain precipitation.

8.3.2 Duration, Periodicity, and Depth of Inundation

- All monitored vernal pools, including the control pools and pools within the preserves, shall be monitored to record water depth over the low point in each basin during the course of six rainy seasons following restoration. From this data,

a water depth–time curve shall be prepared for each basin illustrating depth and periodicity of inundation.

- Prior to the end of the monitoring period, each restored pool shall demonstrate hydrological patterns of duration, periodicity, and depth of inundation which fall within the range of variation observed in the control pools.

8.4 Annual Reports

Vernal pool restoration efforts, whether conducted for mitigation or for habitat enhancement purposes, should include preparation of an implementation plan that is approved by the Wildlife Agencies and the City. The reporting guidelines outlined below are typically required for mitigation projects. Reporting requirements for each proposed restoration project will be determined by the Wildlife Agencies and the City during the plan approval process.

Following submittal and review from City of San Diego, annual reports presenting the monitoring results shall be submitted to the USFWS. These reports shall assess both the attainment of yearly target criteria and progress toward the final success criteria. Annual reports will be submitted following each of the six project years (one construction year and five years of monitoring) for the vernal pool restoration. Monitoring and reporting may be done by the same entity, or the monitoring may be done by qualified biologists hired by the City or qualified volunteer biologists, and the report done by the City, depending on staff availability and budget.

Annual reports shall include, at the minimum, the following:

- Names, titles, and organizations of everyone who participated in the monitoring activities for the year, including those who wrote the report.
- Quantitative and qualitative results for each monitored pool, including statements of success, failure, and remedial actions recommended to reach the success goals.
- A photograph of each pool.
- Topographic maps showing and identifying each monitored pool.

9.0 Completion of Restoration

9.1 Notification of Completion

If the final success criteria have been met at the end of the five-year monitoring program, notification of these events shall be provided to USFWS with the fifth-year report.

If the final success criteria have not been met by the end of the monitoring program, the fifth-year report will discuss the possible reasons for the failure and what should be done to bring the site to completed status. Included in the fifth-year report will be detailed plans to complete the restoration project and meet the final success criteria.

9.2 Agency Confirmation

Following receipt of the report the USFWS shall be permitted to visit the restoration sites to confirm completion of the restoration effort and accuracy of the jurisdictional delineation.

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